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THE NORTHWEST PASSES TO THE YUKON

By ELIZA RUHAMAH SCIDMORE

While Vancouver's ships lay at anchor in July, 1794, in his Port Frederick, the Komtokton of the natives and the Hoonah post-office of today, at the northwest end of Chichagof island, Messrs Whidby and Lemaurier, in a small boat, followed the north shore of Icy straits and penetrated the long Lynn canal, bringing back reports that ended Vancouver's hope and search for a northwest passage through from the Atlantic—De Fuca's straits and Del Fonte's river myths and dreams of "hypothetical projectors" and "closet navigators," as this greatest of surveyors and explorers bitterly termed them.

Whidby's men rowed up that finest fiord of all that landscape quest to Point Seduction, so named because of the "exceedingly artful character" of the natives, who met them at that point and lured them further on up the western arm (Chilkat inlet) to the mouth of the river, just beyond the modern Pyramid Harbor.

These artful natives had then enjoyed trade with white men, and the Chilkats and Chilkoots, really one tribe and closely related, were not only the greatest warriors and boldest buccaneers of the coast, but were great "grease-traders" and middlemen as well. Two "grease trails" led away from the two inlets across the range to the game country beyond, where the milder plains people, the "Stick" or Tinneh tribes of Athabascan stock, were content to trap and trade at great disadvantage, exchanging their pelts and horns for the fish oil and sea products of the coast tribes and the goods which the latter obtained from white traders, Russian, "Boston," and Hudson's Bay Company traders realized

more than one hundred per cent profit on the goods they gave the Chilkats in exchange for furs, and the Chilkats realized a still greater profit when they dealt with the Tinnehs.

For the half century that the H. B. Co.'s ships regularly visited Chilkat inlet the traders never dealt directly with the Tinnehs. The Chilkats were relentless monopolists, meeting the Tinnehs at established camping grounds, at Tagish houses, and other points beyond the range each year, and packing the furs back over the Chilkat or the Shaaksi (Chilkoot) pass. Occasionally they brought a Tinneh chief down under escort as a great reward and honor, to allow him to look at the fire-ships of the white traders. Mr Robert Campbell, of the H. B. Co., who crossed from the Mackenzie river to the Pelly in 1842–'43, wrote: "The usually Chilkat Indians from the Pacific coast were in the habit of making trading excursions to Pelly. They ascended by Lynn canal, thence crossed over the mountains to the head of Lewes river. Descending this river they came to the Pelly, where oftentimes, when strong enough, they pillaged and massacred the Pelly Indians, than whom there could be no more honest men."

In 1848 the H. B. Co. built Fort Selkirk, at the junction of the Lewes river and the Pelly, buying furs directly from the Tinnehs and sending them out by the chain of H. B. Co. forts connecting with the Mackenzie river and Hudson bay. The difficulty of getting supplies into Fort Selkirk had induced the H. B. Co. to consider abandoning it, when the Chilkat chief, incensed at this interference with his fur trade, led a war party across the mountains and plundered and burned the fort. The blockade of the passes was more strictly maintained than ever against Tinnehs and whites.

The first white man to cross the range, according to local Chilkat and common Alaskan tradition, is said to have been a red-headed Scotchman in the employ of the H. B. Co., who, reaching the ruins of Fort Selkirk in 1851, started alone over the old "grease-trail" to the sea. He hid from Indians all the way, but was captured near the coast and held until ransomed by Capt. Swanson, of the H. B. Co.'s *Labouchere*, on its regular visit to Pyramid Harbor. Because of his red hair he was regarded as a shaman and treated with distinction during his stay. Dr Dawson discredits this story of the Scotch pioneer, as Fort Selkirk was in ruins at that time, and he believes the whole story arises from the fact that certain articles belonging to the traders at Fort Selkirk were brought to the trading ship on the coast.

Prof George C. Davidson, who had visited the Chilkat country in 1867, when making a scientific reconnaissance of Russian America for Secretary Seward, returned in 1869 to observe the eclipse of the sun, August 7, establishing his station and observatory at the upper Chilkat village, where he was the guest of the great chief Chartrieh, Klok Kute, or Hole-in-the-Cloud, as that head of the Cinnamon Bear clan was variously known. Secretary Seward and his party were escorted up the Chilkat river in Klok-Kute's war canoe on eclipse day, and, joining Prof Davidson for another day, carried away the astronomer and his instruments before there was time for him to make an intended trip toward the pass. During his stay Prof. Davidson had induced Klok-Kute and his wife to draw a very intelligible map of the route up the river to the Chilkat pass and across to Fort Selkirk, a route Klok Kute had traversed since childhood, and which his father had traversed as one of the war party which burned Fort Selkirk. Lying face downward, the old chief and his wife discussed and laboriously drew on the back of an old chart the lines of all the water-courses and lakes, with the profile of the mountains as they appear on either hand from the trail. The great glacier is indicated by snow-shoe tracks to show the mode of progress, and the limit of each of the fourteen days' journey across to Fort Selkirk is marked by cross-lines on this original Chilkat map, which is still in the possession of Prof Davidson, at San Francisco. There is a copy (Topographical Sheet No. 2018) at the U. S. Coast and Geodetic Survey office at Washington, and this Klok-Kute map was the basis of the first charts.

George Holt, a miner, claimed to have crossed the eastern, the Chilkoot, or Shaesky pass in 1872, and descending as far as Lake Marsh, returned by way of the Teslin to the headwaters of the Stikine, following in reverse a part of the route of Michael Byrnes, of the W. U. T. Co. survey, who came up from the Stikine region to the Teslin and Taglish lake in 1867. Holt crossed the pass again in 1874, and descended the Yukon to the portage connecting with the Kuskokwim.

In 1877 Lieut. C. E. S. Wood, U. S. A., undertook independent explorations in Alaska. Many of his enemies prevented his reaching Mt St Elias, which he wished to climb, but he visited Taylor and Glacier bays on Cross sound, camped and hunted mountain goats around Geikie and Muir inlets, and crossed from the Muir glacier to Lynn canal. He spent some time with the Chilkats and Chilkoots, but neither Klok-Kute nor Donawak,

From a Photograph by F. A. Cleveland

the one-eyed tyrant of the Chilkoot village, would let him cross the mountains, which they pictured as full of dangers, although Lieut. Wood was fortified with messages, gifts, and tokens from Donawak's sister, the wife of Siwash Jack. An account of his stay, "Among the Thlinkets in Alaska," was published in *The Century* magazine July, 1882.

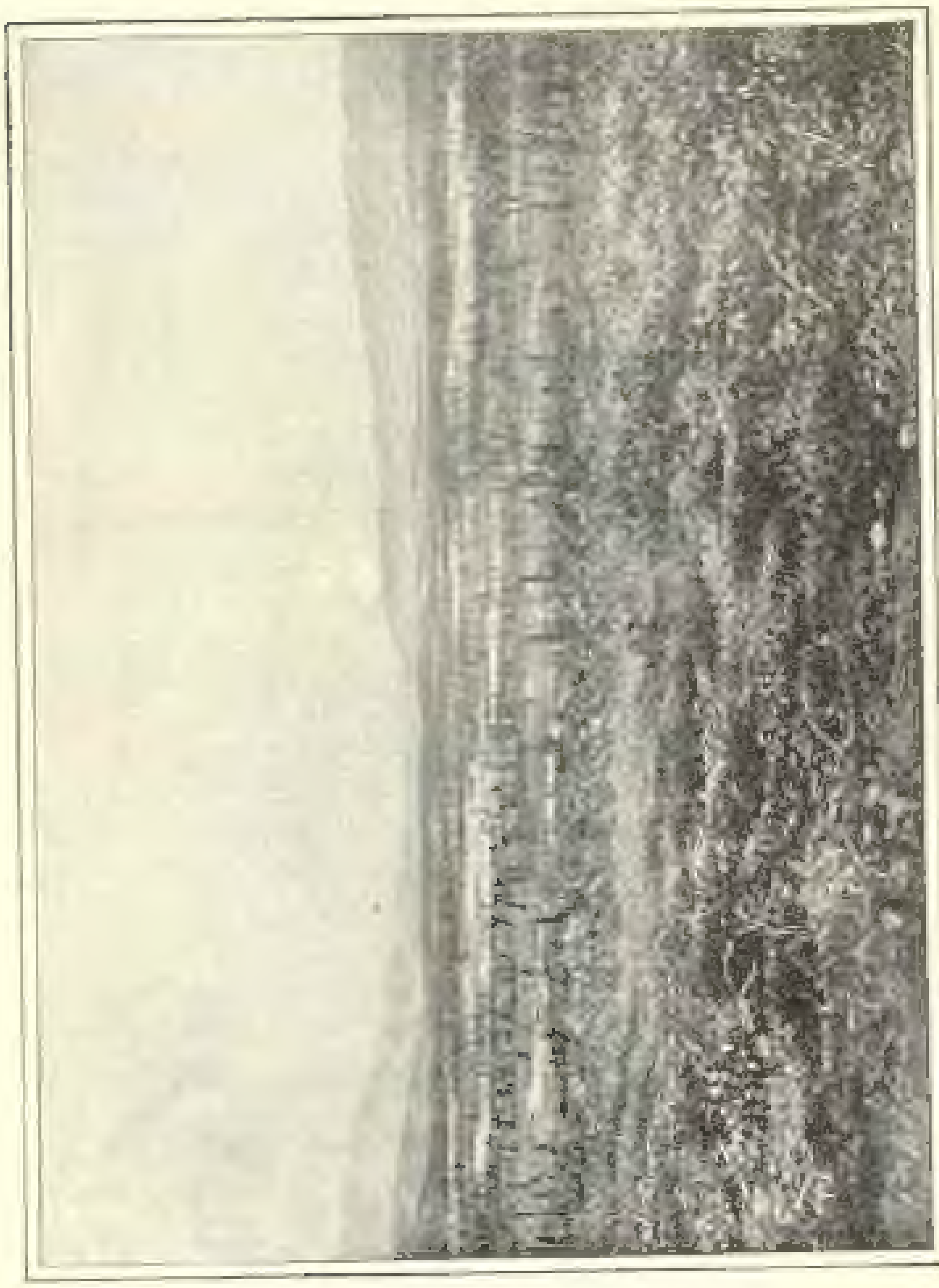
In 1878 Donawak peremptorily refused entrance to the prospectors Rath and Dean, but is said to have permitted George Holt to go as far as Fort Selkirk and return under guard.

In 1880 the same Edmund Dean, with a party of nineteen miners, were placed under the special protection of Klah-Kuhz, through the active interest and clever diplomacy of Capt. L. A. Beardslee, U. S. N., and guided across the passes, after giving assurances that they would not interfere with the fur trade. A trader did slip in in the wake of the prospectors, but being detected, was brought back and his life saved by Capt. Beardslee's earnest intercession. As these miners went in, they met James Wynn (now of Juneau) coming out, and from him received warning of the dangerous rapids in the river beyond the lakes. Wynn has assured me that he had previously crossed the pass in 1872.

Forty-five miners crossed the pass in the spring of 1882 and returned in the autumn, and the Indians, finding that the packing of miners' supplies was more remunerative than the diminishing fur-trade, virtually raised the blockade and established an exorbitant tariff for transportation.

The Doctors Krause, of the Geographical Societies of Berlin and Bremen, spent the year 1882 and the succeeding winter at Pyramid Harbor and in the Chilkat villages, making the ethnographic studies published in the volume *Die Thlinket Indianer* and in collecting for their museum. Klah-Kuhz was, as usual, the patron and protector of scientists, and assisted in their exploration and survey of the Chilkat river and its branches, the Chilkat pass, and the country beyond as far as the great lake named Lake Arkell in 1881. The Drs Krause's maps of this region were published by the Berlin and Bremen Geographical Societies in 1883.

In 1881 Lieut. Frederick Schwatka, U. S. A., crossed by the miners' usual trail the eastern Chilkoot, or Siwash pass, returned at the Perrier pass, and rafted his way down the Yukon to the sea. The miners who went in in 1883 went back for provisions and spent the winter on the upper Yukon.



In 1884 De Severtie, U. S. A., crossed the Chilkat pass along the Krause route, intending to explore westward and descend the Copper river, cooperating with Lieut. Abercrombie, who attempted the exploration of Copper river from its mouth; but neither plan was followed to completion. When Lieut. H. T. Allen explored the Copper river in 1885, his party ascended to the headwaters, crossed the divide to the Tanana, and descended that stream to the Yukon.

In 1890 Mr E. J. Glave, leading an expedition sent out by the *Frank Leslie's Weekly* newspaper, followed the Doctors Krause's route to the Alsek basin, went northward and returning descended the Alsek to the ocean at Dry bay. In 1891 Mr Glave proved his claim that pack horses could be taken over the range and could find sufficient pasturage in the bush country beyond. His "Pioneer Pack-horses in Alaska," published in *The Century* magazine, September and October, 1892, describes his route across to Lake Arkell, a route now known as the Dalton trail—Jack Dalton having been his assistant in the experiment with pack-horses.

The existence of a lower pass still further east, to be reached by an easy trail from Skagway creek, was reported to Mr William Ogilvie during his survey of 1887, and Capt. Moore of his party was detailed to explore it. He determined the altitude of the pass as 2,401 feet above sea-level, and named it in honor of Hon. Thomas White, Canadian Minister of the Interior. It was at once seen that White pass most easily allowed a wagon road to be constructed across to Lake Bennett—a distance of 47 miles and a rise of 2,400 feet, in contrast to the distance of 27 miles and a rise of 3,500 feet on the Chilkoot, Shaseki, or Perrier pass, again named as the Dyea pass by Mr Ogilvie.

The passes to the Yukon basin from Taku inlet and river were known to H. B. Co. traders and the W. U. T. Co. surveyors, but were first definitely exploited as a route to the Yukon mining regions by the expedition of Lieut. Schwatka, U. S. A., and Dr C. Willard Hayes, of the U. S. Geological Survey, in 1891. They followed the north fork of the Taku river and crossed to Lake Teslin, where they launched canvas boats and proceeded without interruption to Fort Selkirk. The river connecting Lake Teslin with the Lewes—known to the Indians as Teslintoo, and as the Hootalinqua or "Hoodly-Link" to the miners—was marked on the Coast Survey chart at the time as the Nas-a-thane, or "no salmon," and was renamed the Newberry river by Lieut. Schwatka.

OVERLAND ROUTES TO THE KLONDIKE

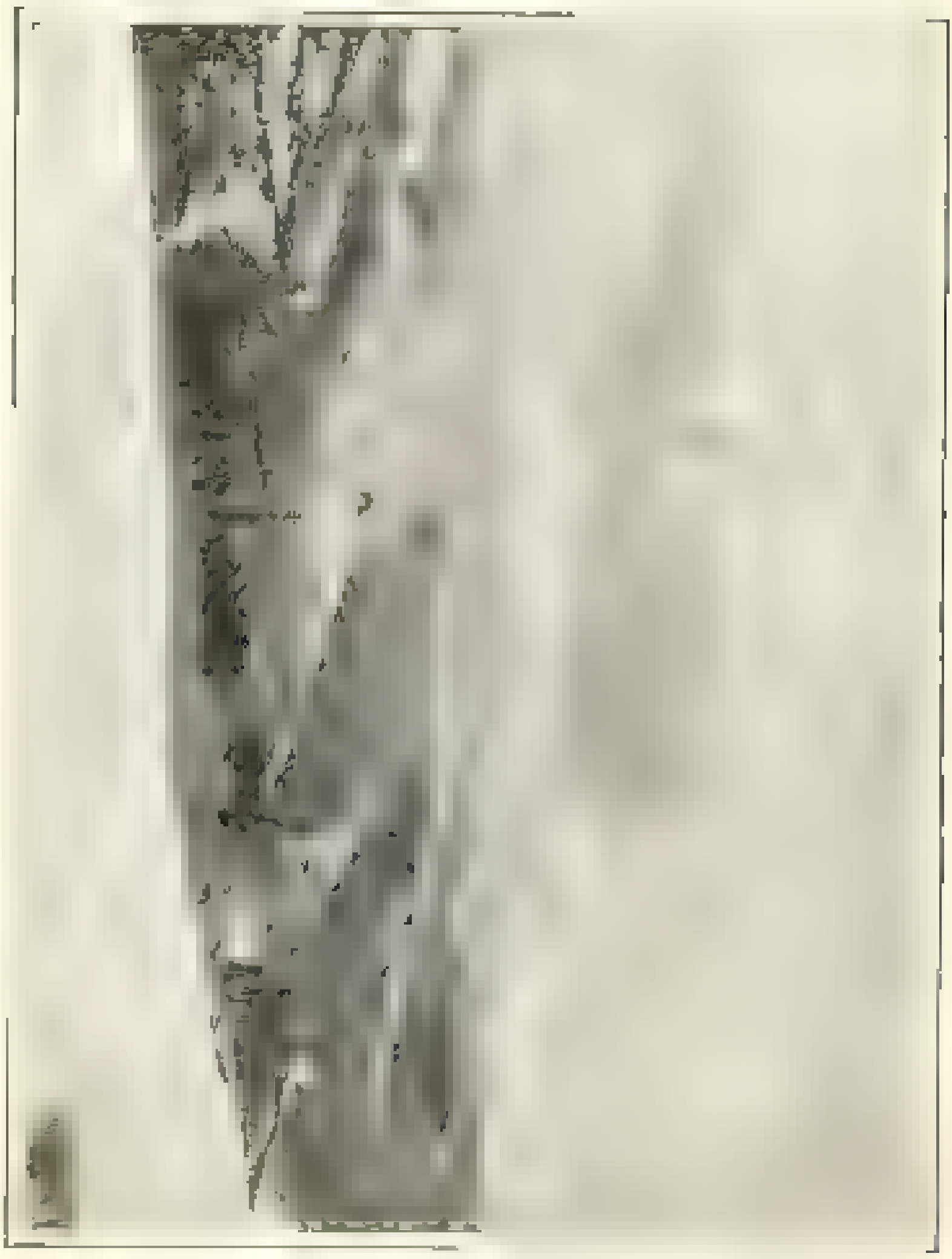
[illegible]

[illegible] where in summer it shines all day and, as an Irishman might [illegible]

[illegible] scarce. There is little game, and not many fish. There never [illegible]

[illegible] Dawson City nearly all the features of the Arctic zone are realized. The ice does not go out of the river, even at Dawson, till late in May or June, and the river closes early in September.

Having decided that he wishes to take the risk involved in [illegible] this gold country, the [illegible] must decide on his route [illegible] the seaport. Of the overland, there are at present three—the Edmonton and Peace River route, the "Old Telegraph Trail," and the Kamloops inland route. The Edmonton route [illegible] at Edmonton, a small town at the end of a northern spur of the Canadian Pacific Railway, and proceeds by way of Lesser Slave lake to Peace river, thence across the divide into the valley of the Stikine river to Telegraph creek and Teslin lake, which is the headwaters of the Yukon. This route is a very long one, and [illegible]



sixty days to go from Edmonton to Teslin lake. The citizens of Edmonton are using all means to make this route easy and safe. It can not be safely used before the middle of May. Pack horses are plentiful, and feed is good from May 15 to November.

The second overland route, the "Old Telegraph Trail," begins at Ashcroft, a small village on the Canadian Pacific Railway, and follows the Fraser river over an excellent stage road maintained by the Dominion government to the little town of Quesnelle, 223 miles north. Good stopping-places abound along the road. Here the road ends, and the trail turns to the west, and, passing over a nearly level country with good grass, reaches Fort Fraser, on Fraser lake, 125 miles from Quesnelle. Fort Fraser is a Hudson's Bay post and trading store, with two white men and several families of Indians, quite well civilized, settled near. A limited amount of supplies will be obtainable here. Up to this point the trail is quite level, and though there are hundreds of creeks none are deep or hard to pass. The three rivers, the Blackwater, the Mud, and the Nechaco, can be forded except at high water when rafts will have to be used and horses paddled across. Scarcity of feed is very rare. Many trails cross the route and it will be necessary to have an Indian guide, or some means should be taken to mark the main trail. There are villages where feed for the horses can be found in abundance.

Beyond Fort Fraser the next supply point is Stuart lake, a trading post, with three or four whites and eight or nine hundred Indians, who live [illegible] make their living by hunting, fishing, and trapping. From Fort Fraser to Hazelton is probably 225 miles. The trip from Quesnelle to Hazelton can be made by pack animals, and will require from sixteen to twenty days. Hazelton has a small population of prospectors, with whites in the neighborhood. A Hudson Bay post, a few miners and a couple of stores are all that are to be found here, although about 15,000 Indians trade at this point. The goods are brought up by a Hudson's Bay boat on the Skeena river during high water.

From here it is about 200 miles to Telegraph creek. The trail has been traveled for thirty-five years, and the government has spent thousands of dollars to keep it in first-class condition. It will probably take about ten days to cover this distance, as it is a little harder than that before reaching Hazelton. There are two large stores at Telegraph creek at present and already a small town has mushroom sprung up there. From Telegraph

creek over to Teslin lake an trail will be opened and [illegible] by the Canadian government. A wagon road will be constructed and a bill has already passed the House of Commons granting concessions for a railway. The road at present is estimated to be about 150 miles long and can be traversed in ten days or less. The way is wooded and has no dangerous features. At Teslin [illegible] and the rest of the journey made by water.

The Ashcroft trail and the Kamloops route, which is practically the same in character, is all along. It begins in a genial climate between the coast range and a spur of the Rocky mountains, and is therefore somewhat like eastern Washington in temperature and rainfall. After leaving Quesnelle the trail plunges at once into the wild country, and to those who are [illegible] if properly treated will be a source of aid in case of necessity.

The advantages of this route are offset, however, by obvious disadvantages. It is very long. According to the most liberal estimates it will take forty days from Quesnelle to Telegraph creek, though it can possibly be done in less time, provided there are no delays for bridge building. It will be possible to [illegible] it, sending part of the outfit by way of Victoria to Telegraph creek, and by leaving an advance order for supplies with the Hudson's Bay Company to be delivered on a certain date from their stores at Hazelton.

It will not do to leave Quesnelle until the grass comes, say by the first of May. Before that time, even though it might [illegible] the waters and [illegible] After the first of May the Ashcroft trail will be a comparatively [illegible] easy route to the Cassiar and Teslin lake mines, with no duties and very little toll to pay.

In the matter of outfitting it is probable that Kamloops, Ashcroft, and Quesnelle will be able to furnish complete outfits for a limited number of pack trains, and being open the entire way, supplies in case of need could be ordered forward by telegraph from Victoria, Vancouver or Winnipeg.

It is safe to count on about fifty days' time from Ashcroft, and while the expense will be light, probably not exceeding [illegible] in hand on reaching Teslin lake.

THE FUTURE OF THE YUKON GOLDFIELDS

By William H. Dall,

Smithsonian Institution.

The conditions likely to prevail in the near future at the
[illegible]
points. Some discussion of them may, therefore, be useful.

It is well understood among those who know and experience that food transport is the most important question for the welfare of gold seekers and others entering the Yukon as that of chief importance. Man and, to some extent, domestic animals may reach the Yukon by the various routes, but their food, tools, tents or other portable shelter, and the heavy clothing necessary for protection against exceptional conditions of temperature and weather must be carried. No man can carry his own provisions and outfit without assistance. Even for dogs, the most economical draught animals, it is necessary food should take up a considerable proportion of their load. It is hopeless to attempt to transport the necessaries of life for thousands of people by the means hitherto in use.

A conservative estimate places the number of people at present in the Yukon at 5,000. Few have estimated the number destined of going in during the present season as low as 30,000. Should anything like that number succeed in reaching the Yukon during the next six months, it is evident that the transportation over that of the past season must be increased tenfold. A certain proportion must be allowed for waste, losses in transportation before reaching the destination, or the excess of need beyond
[illegible]

The number of trips to Dawson, from the seacoast, made in 1897 by the steamers now on the river was seven in all. While with all conditions favorable two trips per season can be made by a capable vessel, it is not safe to reckon on more than one. For 30,000 people seventy trips would have to be made in order to eliminate the possibility of starvation which has stared so many in the face under present conditions. This provides not for comforts, not for necessary furniture, tools, and machinery adequate to improve conditions as they exist, but merely to pre-

NOTES ON [illegible] OF ALASKA

By E. W. Nelson,

Biological Survey, U. S. Department of Agriculture.

Among the many interesting features to be seen by visitors to [illegible] the brief summer, the otherwise desolate tundras are animated by swarms of water-fowl, which arrive from the south in spring as soon as the bare ground begins to appear and after a short delay set about their summer housekeeping. The water-fowl on the rivers and lakes of the interior are the familiar species which winter among the prairies and marshes of the western United States. The Canada, Hutchins, white-fronted, and snowy geese are there with swans and fresh-water ducks of many species. Besides these, sandhill cranes and numerous waders abound. One of the most strikingly colored species [illegible]

The most interesting part of the bird-life of this region, however, is found along the coast of Bering sea. Four species of eider ducks occur here, some of which are very handsome. Among [illegible] accompanying illustration.*

The emperor goose is another fine bird peculiar to this country, having its home in the marshy region between the mouths of the Yukon and Kuskokwim rivers. It is the most elegantly dressed of its kind in America. The top and sides of the head and neck are snowy white, the chin, throat, and under side of the neck blackish, and the feathers of the back a soft, bluish gray color bordered by a black crescent, next to an outer tip of white. The under surface is similar, but smaller, and the feet are yellowish orange.

The black brant pass along the coast of Bering sea in great numbers every spring and afford royal sport to persons fortunate enough to secure good stands while the flight lasts.

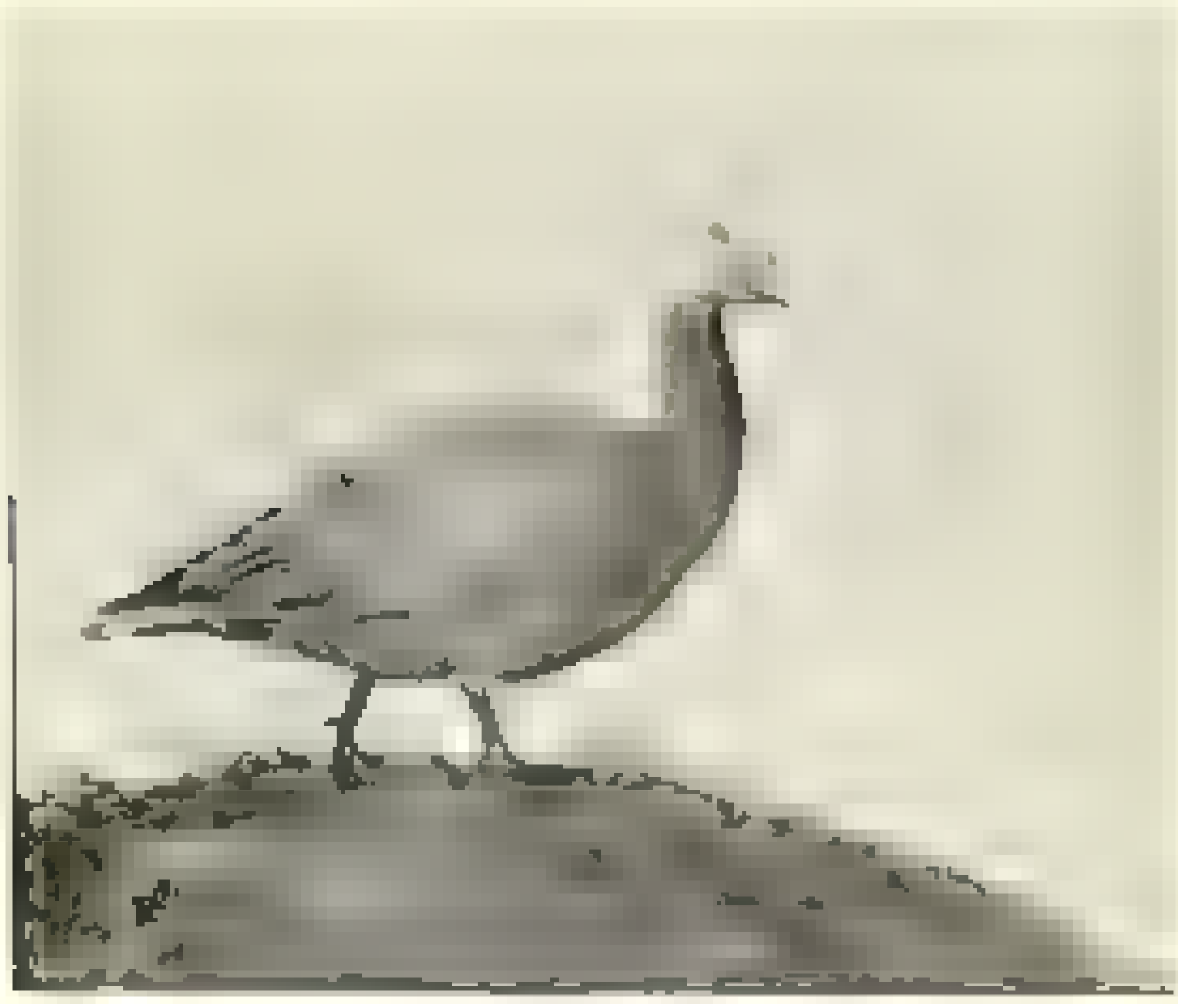
During the four years the writer lived at St. Michael water- [illegible]

* I am indebted to Mr. F. W. True, Executive Curator U. S. National Museum, for the photographs of bird and mammal groups in the Museum which illustrate this article.

although to me, the texture [illegible] are about the poorest flavored of the American grouse. Their [illegible] mottled brown [illegible] to one of snowy white. In winter in the valley of the Kuskokwim the ptarmigan gather [illegible]

I have seen them in winter in flocks of hundreds among the thickets of scrubby willows, and when flushed it seemed as if the snowy surface of the ground had suddenly burst up and taken wing.

When the first mossy knolls appear in spring the willow grouse begins to lose its snowy winter dress. At first a few brown feathers [illegible] about the base of the neck, which gradually increase in



number and [illegible] until the head and neck becomes brown while the body is still white. This progressive change keeps pace with the melting snow, and with the disappearance of the last drifts the last white feather has been dropped and the bird is in full summer [illegible]

[illegible] with loud challenging notes of defiance, accompanied by much fierce [illegible]. When the ground is mostly bare, the snow remaining only in scattered drifts, the males choose [illegible] white patches as their stations [illegible] for the admiration of their feminine friends. In the tundras they may be seen and heard on all sides as they fly up with stiffened

[illegible]

among the mountains and valleys of the interior. Formerly large game animals were much more numerous in Alaska than at present, and the decrease has gone on almost entirely since our ownership of the country. The history of the fur-seal is well known. The sea otter is another animal that is passing away. The end is even more certain than that of the fur-seal, for it is a dangerous thing for an animal to wear a coat worth from five hundred to a thousand dollars. All that has kept the sea otter from extinction is its wariness and the fact that the stormy parts of the coast it frequents render its pursuit hazardous and uncertain. Upon the mainland are several fine game [illegible]

[illegible]

There are two kinds of these deer—a large, dark-colored one called the woodland caribou, which lives in the wooded districts of the upper Yukon, and a smaller paler kind, called the barren ground caribou, which lives in the open tundras or treeless country. Barren ground caribou were once exceedingly numerous, and the coast lines along the shores of Norton sound are still scored with their trails leading diagonally up to [illegible] summits, where the natives used to go in summer to [illegible] as they swarmed on the tundras. But even so far back as 1877 the caribou was very rare along most of the coast of Bering sea. When Alaska passed under American control it became possible for the natives to secure breech-loading rifles, especially where whalers and trading schooners called, and the result was a rapid slaughter of the large game.

Since the barren ground caribou usually live in the open tundras where there is no cover, it is extremely difficult for the hunter to approach them. Like too many people of our western

[illegible]

[illegible] make a point to kill anything which comes within their interest before they became sophisticated by the common use of guns, the Eskimos had an ingenious method of hunting them in open ground which one old hunter said was very successful. The

[illegible]

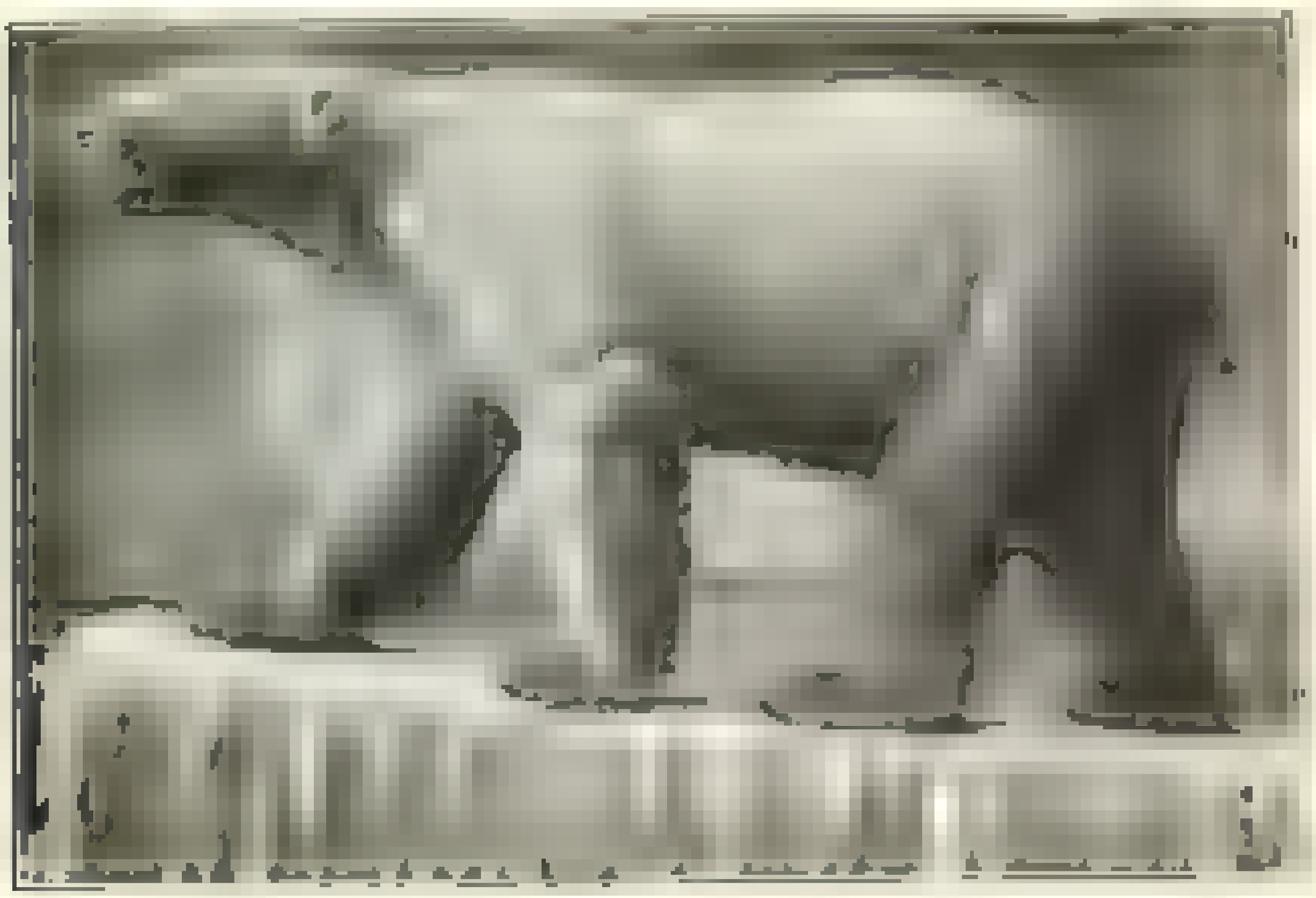
[illegible] upon [illegible] they would start directly for the [illegible]

[illegible]

their bodies touching, so that from the front they appeared like one man. When they were still some distance away, the caribou would throw up their heads and start off to circle around to the leeward. The hunters kept on in their original course, appear-

In the big [illegible] bordering the Pacific [illegible] Sitka, mountain goats occur, but we have no definite information concerning their range and abundance. Owing [illegible] of Dall's sheep, it seems probable that in many cases they may have been mistaken for goats.

Bears also are very numerous in some places, and several kinds are known to occur. The huge bear of Kodiak and [illegible] [illegible] looks as if he belonged to the animal life of a former geologic age, when animals of gigantic size roamed the earth. Black bears are generally distributed over the mainland except on the barren tundras bordering the Arctic coast. About the [illegible] caverns in the rocks, where they make a bed of leaves and grass [illegible] cases the hunter wraps a blanket about h[illegible] and with it thus protected thrusts it out for the bear to seize as [illegible] fatal thrust under the guard thus formed. Both [illegible] and cunning. The Eskimo hunters are very careful not to speak in a disrespectful manner of bears and are especially guarded



old bear. An Eskimo living at Cape Vancouver once told me of an encounter he had had with a walrus while seal hunting in the open sea off the cape, in which he and a companion had a narrow escape. They met and killed a young walrus without having seen the female. A moment later she arose in the water and, catching sight of the hunters, uttered a hoarse bellowing cry and dashed at them. The men paddled for their lives and reached a cake of ice just in time to escape. Here they were kept prisoners for nearly a day. Several times, supposing she had gone, they launched their kyaks, but the moment they did so she appeared and drove them back on the ice. During our cruise in the Arctic we saw many females with young, and the watchfulness of the old ones was very noticeable. The young nearly always swam directly in front of its mother, and the latter, in diving, always carried the little one down with her by resting the points of her tusks on its shoulders and forcing it down.

In the old days when caribou were abundant, wolves were common and ran in large packs. With the growing scarcity of caribou the wolves decreased, until, during my residence at St Michael, they were uncommon along the coast of Bering sea and the adjacent interior. The white and blue arctic or stone foxes are common on the barrens, and red foxes are also common and much more widely distributed. [illegible] for its [illegible] quality of the black fox skins taken there every winter. Canada lynxes, wolverines, land otter, American sable and mink are among the [illegible] Alaska in the recent developments.

Among these rare and more widely known animals there are many animals of minor local interest. The whistling marmots [illegible] in the mountains along the upper Yukon and Tanana rivers, and little conies are also found in that region. The last-named animal makes its home in broken masses of rock and has [illegible] a voice like that of a toy dog.

The great increase in the population of Alaska which is now taking place cannot but have a decided effect upon the large game. Most of the prospecting parties will be [illegible] with [illegible] their scanty camp fare. What is going on in thousands of lo- [illegible]

be disastrous to such fine animals as bears, mountain sheep, caribou and moose. Unfortunately not a museum in the world has even a passable representation from Alaska of any of these animals.

That threatened early extermination of such fine species is to be greatly deplored, but cannot well be avoided, and it is altogether probable that within two or three years it will be extremely difficult, if not impossible, to secure specimens for scientific purposes. The U. S. National Museum in Washington is the proper repository for a full representation of the animals peculiar to our territory, for exhibition purposes as well as for study, and it would be a great loss to science if any of the large Alaskan animals become extinct before a proper series of skins and skulls is in the possession of this institution. I wish to impress this upon settlers and others going to Alaska the present season, in the hope that, having their attention called to the importance [illegible] in placing them in the National Capital.

CLIMATIC CONDITIONS OF ALASKA

By General A. W. Greely, U. S. Army

The most obvious elements of climate are those of temperature, humidity, precipitation (rain, snow, fog, etc.), and winds, and of these temperature and precipitation affect most potently the comfort and prosperity of man.

Some 25 years ago the writer was one of several consulted by the late General A. J. Myer as to the establishment of stations of observation in Alaska, and in 1881 he was encouraged by the late General W. B. Hazen regarding the extension of the system of such observations to the same remote and almost unknown region. A certain class of persons, those who pride themselves on being strictly practical, scoffed at a policy that would expend a few hundred dollars yearly for the purchase of instruments and for the cost of recording meteorological observations by volunteer observers on the outer edge of the civilized world. "Who knows or cares," said they, "whether the Yukon river flows into Bering sea or the Arctic ocean, and of what use is a knowledge as to the summer and winter conditions under which the animals of that river valley live and thrive?"

[illegible]

and the winters marked with excessive cold, though the winds [illegible] weather, usually below zero, continues for months, and even in July, with midday temperatures of 70° to 80°, it is no uncommon occurrence for the temperature to fall during the night to the neighborhood of the freezing point.

Let us now turn from general statements to specific data from such selected stations as are acknowledged as climatically typical of various parts of Alaska. In so doing one turns naturally to Dall's admirable article and tables on the meteorology of Alaska published in the *Pacific Coast Pilot*, 1879. Although Dall's work and charts are 21 years old, yet they are the only discussions and data that have ever been published on the general meteorological conditions of Alaska.

St. Paul island, Bering sea, has a typical marine climate; its lowest recorded temperature is —12° and its maximum 62°. The temperature rarely exceeds 50°, and in 1875 it only reached 45°. February is the coldest month, with an average temperature of 20.1°, and August the warmest, with a mean of 48.1°.

Sitka is a typical coast station for extreme southern Alaska and Point Barrow for the northern. In 41 years Sitka had extreme temperatures of 88° and —4°. The coldest month is January, at [illegible]4°, and the warmest August, 54.9°. Every year the rain or snow falls on 200 days on an average. In 1856 rain or snow fell on no less than 285 days, but in 1883 there were only 114 such days. The annual rainfall is very great, being 84 inches, of which about one-half falls from September to December.

Point Barrow, the extreme northern point of Alaska, is in 71° 23' N., 156° 40' W., and its climate is important as indicating closely that of the coast-line of the whole tundra or moorland region extending along the Arctic ocean. It should be remembered, that as one goes north the winter becomes colder and longer, the summers warmer and drier. The observations of Capt. P. H. Ray, 1881-'83, and of H. M. S. *Plover*, 1852-'54, are the basis of the following notes: The winter is long, as freezing weather obtains from early September to early June, when summer comes in full force. The mean winter temperatures are December, —15.4°; January, —17.5°, and February, —18.6°, with occasional periods when the cold is from 40 to 52 degrees below zero. The average heat of July is 38.1°, and of August 37.9°, and the temperature often rises above 50° and has touched

35.3°. The snowfall averaged, amounting [illegible] to 8.25 inches, the greater part falling from July to October. The severity of the cold is indicated by the fact that the ground was frozen [illegible]

and gales are most frequent from August to November and the lightest winds are from February to May. [illegible] snow [illegible] about May 1. The [illegible] snow-free late [illegible]

The watershed of the Yukon includes the regions whose climatic factors are at present of the greatest interest to prospective visitors. Fortunately, there are sufficient data to justify conclusions that most closely approximate the truth.

St. Michael (63° 28′ N., 162° 14′ W.), although an island, practically borders the mainland near the mouth of the Yukon. Its climatic characteristics have been fully set forth by Mr. E. W. Nelson. The winter is very long, the average temperature being below the freezing point from October to April inclusive. The coldest month, February, averages, from twelve years' observations, −2.3°, but in 1877 it was −24.7°. A temperature as low as −55° has been observed. The warmest month, July, has a mean temperature of 53.6°. It should be said that one summer month of any year closely resembles the same month of any other year, but there are great variations between the same winter months of various years. Spring usually opens about the middle of May, but it reverts more or less to winter through a part of June. Summer is very depressing, from its frequent spells of misty rain and the prolonged presence for many days of unbroken, low clouds. Winter is marked by long periods of practically clear days, which are usually of intense cold. Strong gales occur irregularly through the year. While most frequent in autumn, yet fierce winter storms are not uncommon, which, with their terrible accompaniments of blinding clouds of snow and temperatures considerably below zero, are wisely dreaded, as even the hardy natives seldom [illegible] therein. The harbor closes as a rule by October 15, and rarely opens before June 10. The breaking up of the Yukon about the 1st of June is usually followed by several foggy days. Very [illegible] snow are frequent and continued. The precipitation is approximately 15 inches annually, of which the greater part falls from July to September. Snow has often in summer, sometimes in notable amounts. Rain or snow falls three days out of five from August to October, but only one out of four from January to March.

[illegible] of warm, hazy days, free from high winds or much rain. The Yukon closes about October 20 and opens late in May. At Ikogmut mission, 61° 47′ N., 161° W., the river closes about November [illegible] closed until June 5.

Mr A. J. Henry gives in the *Monthly Weather Review*, August, 1897, other temperature means for short periods. The lowest monthly means are as follows: Anvik, 62° 37′ N., 160° W., December −3.1°; Nuklukyet, 65° 10′ N., 152° 45′ W., January −11.1°; Belle Isle (a short distance up the Yukon from Circle City), 65° 50′ N., 142° 38′ W., January, −16.8°; Camp Colonna, about 64° 45′ N., 141° W., February, −15.3°; Camp Davidson, about 67° 30′ N., 141° W., January, −17.4°; Fort Reliance, 64° 10′ N., 139° 25′ W., January, −28.7°.

[illegible] ability are guarantees of their worth. While they do not give all the mean temperatures, yet they record the [illegible] of value. In July only the temperature [illegible] the temperature rose on 20 days above 70° and three times above 80°. The extreme severity of the winter is indicated by the fact that from December 1, 1895, to February 1, 1896, the temperature fell below zero every day. On 35 days it fell lower than −40°, on 14 days lower than −50°, and on nine days lower than −60°. The mean temperature for January, 1896, was −4[illegible]°, and for February, [illegible]°. Bright weather is the rule. From October 1, 1895, to the 1st of May following, snow fell on only one day in seven. In June, 1896, however, it rained on 12 days and the temperature rose above 80°. The Yukon broke up on May [illegible] until October 20; it was frozen solid November 5.

[illegible] Dawson, in 1880–'81, communicated to THE NATIONAL GEOGRAPHIC MAGAZINE of November, 1897, by Mr E. W. Nelson, con[illegible] cember, January, and February were −31°, −7°, and −2° re[illegible]

—41° and —60°. Snow fell but one day in February and 25 days were perfectly clear.

With the end of May summer comes at once, and Yukon [illegible] the [illegible] vegetation develops with astonishing rapidity until opening September brings sharp frost almost daily.

By methods familiar to [illegible] the temperature means for the three coldest months—December, January, and February—have been calculated for all the points hereafter named except [illegible] Yukon, [illegible]; Anvik 62° 38' N. 160° W., [illegible]; Circle City, —1[illegible]°; and Dawson 64° 04' N. 139° W., —21°. Any single winter may be considerably warmer or colder than as here calculated, but these means are practically correct and afford a good idea of [illegible] points in the valley of the Yukon, and therefore have a definite value for all who seek to wrest from rugged and inhospitable Nature the golden hoards of Alaska.

A YUKON PIONEER, MIKE LEBARGE

The first white men to explore the Yukon between the Russian settlements and the Hudson Bay post named Fort Yukon were Frank Ketchum of St. John, New Brunswick, and Michel Lebarge, of Chateauguay, Quebec. After the death of the [illegible] Kennicott at Nulato in May, 1866, the expedition which he had planned and which was only waiting for the ice to pass out of the river to make a start, was loyally and successfully carried out by his chosen and faithful companions. They ascended the river from Nulato to Fort Yukon and then returned, crossed the portage to St. Michael's [illegible] report to the commander-in-chief of the Telegraph expedition, Col. Chas. S. Bulkley, at that point. The following year the party was augmented by Wm. H. Dall and Frederick Whymper, who wintered at Nulato. Ketchum and Lebarge undertook a remarkable journey over the [illegible] to Fort Yukon in March, accompanied by two Indians. They arrived safely at their destination just as the ice was breaking up, and after the freshet was over took birch canoes at Fort Yukon and continued their explorations to the junction of the Lewes and the Pelly, the site of old Fort Selkirk. Returning, [illegible] of the party having made the journey to that point in canoes.

the Russian-American Fur Co., and in 1871 entered the service of the Alaska Commercial Company, from which he retired, with a modest competency, in 1875. He is now living in his native town in the Province of Quebec. An indefatigable traveler, a delightful companion on route or by the camp fire, full of experience of whatever befell, tactful and upright in his dealings with the natives, generous and helpful to the inexperienced—in short a [illegible]

His services to geography are commemorated by Lake Lebarge, on the direct route to the Klondike, and Lebarge river, an affluent of the Yukon, from the north below Fort Yukon. The name Lebarge has been variously spelled, the form here used being the original and has been adopted as here written by the U. S. Board on Geographic Names. Frank Ketchum lies under the green turf of an Alaskan hillside. May his faithful companion and our good friend survive for many happy years.

WM. H. DALL.

ALASKA AND ITS MINERAL RESOURCES*

By SAMUEL FRANKLIN EMMONS

U. S. Geological Survey

INTRODUCTION

Alaska was first visited by a Russian expedition under Bering in 1741. In 1799 the territory was granted to a Russo-American fur company by the Emperor Paul I, and in 1844 the charter was renewed for twenty-four years. In 1867 it was ceded to the United States for a money payment of $7,200,000. The first mining excitement in the interior was in the Cassiar mining district in British Columbia around Dease lake, near the head of the Stikine river from 1874 to 1887. Later, prospectors found their way into the more northern regions and down the valley of the Yukon into American territory, where they discovered [illegible] creek, small southern tributaries of the Yukon. In the autumn

* This paper, published with the permission of the director of the U. S. Geological Survey, is an abstract of a pamphlet prepared by his direction to accompany a map of Alaska, embodying such information, obtained from data in the possession of the survey, as it was thought would prove useful to the traveler or prospector who sought that region.

Becker and W. H. Dall, under orders of the Director of the United States Geological Survey, made examinations of the

[illegible]

[illegible]

tions, masses, etc. of the gold-bearing rocks of the Yukon district. It is from the reports of these later explorers that the data contained in the following pages have been compiled.

Alaska has an area of 590,884 square miles. It is roughly quadrangular in outline, with a panhandle extending southeast along the coast and a peninsula stretching out into the ocean on the southwest, which continues in the chain of the Aleutian islands that separate Bering sea from the Pacific ocean. Its eastern boundary is formed by the 141st meridian of longitude

[illegible]

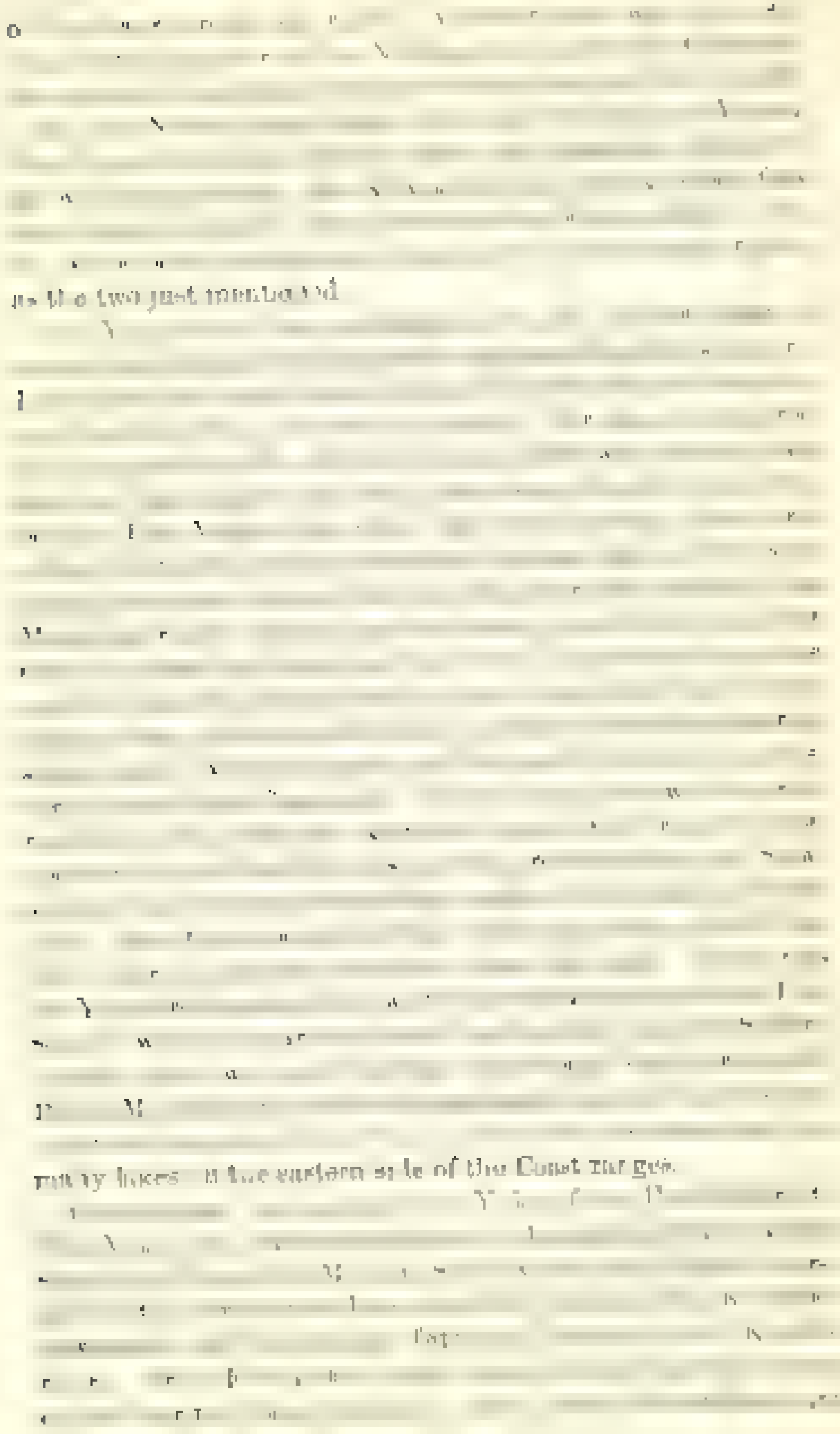
land, Cape Prince of Wales, is on the 168th meridian, or within 54 miles of the easternmost point of Asia. In latitude it extends from 54° 40', the southern point of Prince of Wales island, to Point Barrow, in 71° 23' north latitude, far within the Arctic circle. Its greatest extent in a north-south line is about 1,100 miles and from east to west 800 miles.

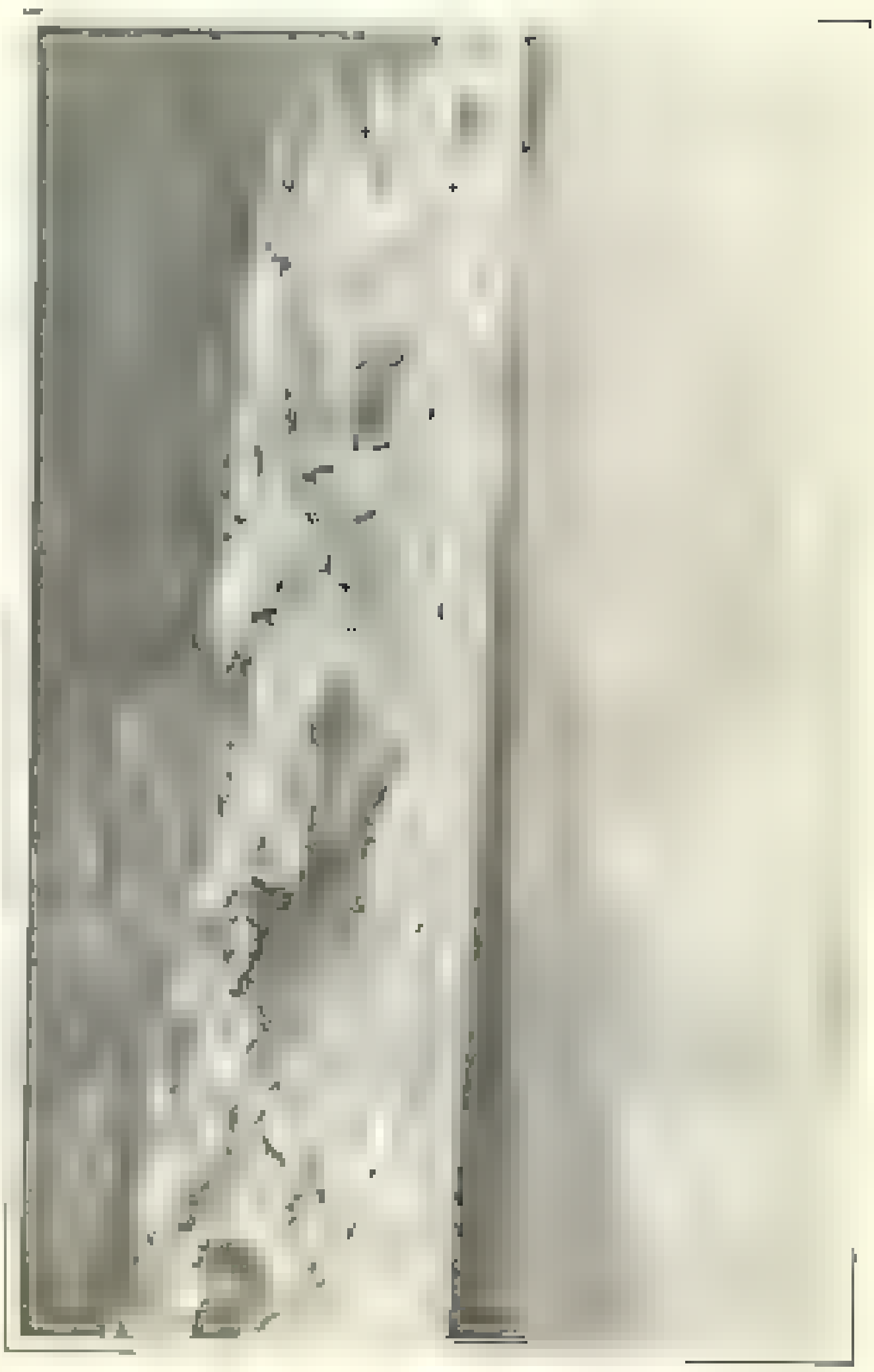
The coast line is much broken by arms of the sea, reaching far inland, either as open bays, as sounds, or as submerged river valleys

[illegible]

cover an aggregate area of 31,205 square miles and which as a rule are very mountainous. The chain of the Aleutian islands, stretching nearly 1,500 miles into the Pacific ocean, is largely of eruptive origin and contains many volcanic craters, some of which are yet active. They rise very abruptly from the sea, often to an elevation of several thousand feet, one on Unimak island reaching a height of [illegible] feet.

The Alexander archipelago, which occupies the coast strip, the best known and most frequented part of the territory, represents the submerged portion of a narrow mountain system. The archipelago consists of 1,100 islands, the largest and most southerly of which is Prince of Wales island. The tortuous passages and relatively narrow waterways are of fjord form and bear evidence of previous occupation by glaciers. In some cases, as at Glacier bay, enormous living glaciers are found at their head. The islands themselves are mountainous, attaining an average elevation of 2,500 feet. On the seaward





[illegible]
stated, since north of the 49th parallel the uplift of the Sierra
[illegible]
eral system.

The Coast range proper is a broad elevation, but with many scattered peaks, but not differentiated into continuous ridges.
[illegible]
valleys. To the east is a plateau-like region which descends gradually to the north, from an elevation of 5,000 feet in the upper lake region to 3,000 feet in the lower Lewes and Pelly river systems. The river valleys in this stretch often are 2,000 to 2,500 feet below the general plateau level.

In the interior region the soil is frozen for a large portion of the year, so that there is comparatively little rock decay. Where there is no timber the surface is generally covered with an abundant growth of moss. This, wherever the surface material is sufficiently compact to become impervious to water by freezing, produces large areas of swampy tracts, even on sloping ground, which, except in the glaciated regions or where cut through by large streams, obscure the rock surface and render difficult the work of the prospector.

The northwestern continental ice-sheet, or Cordilleran glacier of Dawson, which centered in British Columbia between latitudes 55° and 59° N., did not extend into the interior region north of the 62d parallel. Hence the greater part of the Yukon basin has not been glaciated except by local glaciers. This fact has been readily recognized by the geologists who have visited the region in recent times, and is evident from the distribution of the erratics by their abundance above this line and their absence below it.

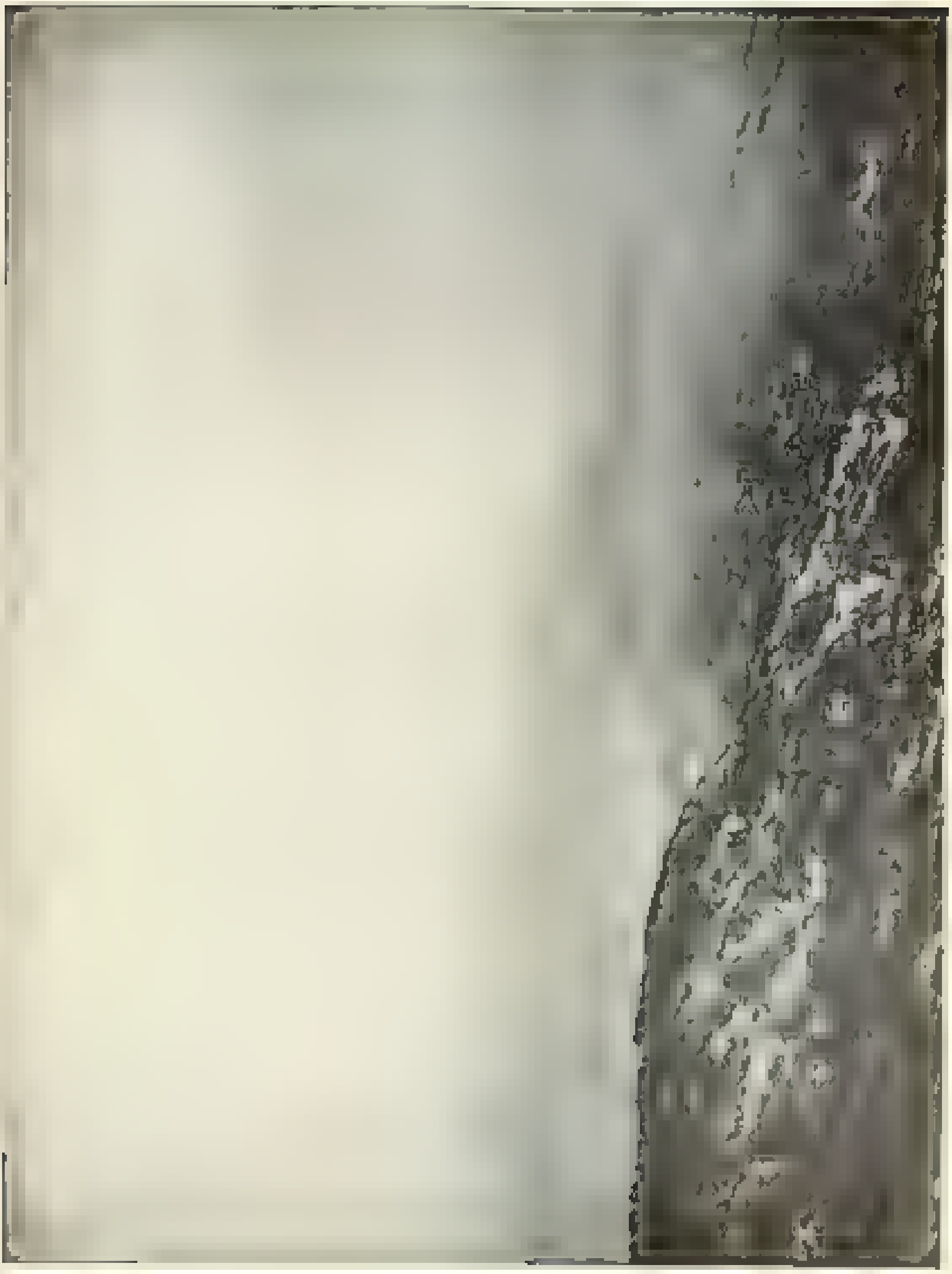
The Yukon or all-water route.—This route is by ocean steamer from Seattle or San Francisco to St. Michael, near the mouth of the Yukon, thence by river steamboat up the Yukon to Dawson. The length of this route is about 4,400 miles, there being nearly 2,700 from Seattle to St. Michael, and about 1,600 up the Yukon to Dawson. Those taking this route aim to leave St. Michael early in July, in order to avoid the delays and obstruction to progress caused by sand bars at low stages of water later in the season. The time from Seattle to St. Michael is about twenty days, and that from St. Michael to Dawson the same, making about forty days for the trip. Under favorable weather and circumstances it may be made in less time. Though this route is the one over which commercial companies operating in the Yukon country

[illegible]
enter in the spring, since at that season it takes several weeks [illegible]

vantageous for persons unable to rough it on the trails.

The Skagway or White Pass route.—From Seattle to Skagway a distance of 1,115 miles, the route is by ocean steamer northward along the coast, and finally up Lynn canal. It is practically [illegible] an almost continuous barrier of densely wooded islands. The [illegible] on the east side of Dyea inlet, a branch of Lynn canal. Its [illegible] to get across the trail is said to be about 8,000. Dyea is situated four miles north of Skagway, west of the mouth of Dyea river and at the head of Dyea inlet. The rise and fall of the tide [illegible] changes [illegible] of the beach, to which freight is taken [illegible] several new [illegible] wharves are said to be now in process [illegible]

[illegible] nett, whose waters flow into the Yukon. The summit of White [illegible] road, which crosses the river several times by ford. Although [illegible] summit is a steady, hard climb. But [illegible] [illegible] which is the ordinary camping place. The trail passes the two small lakes known as Summit and Middle lakes, on whose [illegible] for-



[illegible]age may be secured when the water is not frozen. Midway [illegible] Lake Lindeman, about three miles before [illegible] lake [illegible] the Canadian customs-house officials have put up a large log cabin, which is used as a [illegible]. At this point a trail branches off to the [illegible] down to [illegible] lake, [illegible] there are seven miles of [illegible] rapids [illegible] between [illegible] miners [illegible] for the Yukon are warned from taking this route. At the head of Lake Bennett the [illegible] meets the Chilkoot trail. The [illegible] way [illegible] somewhat longer than that over the Chilkoot pass, but the pass is much lower. It requires, however, [illegible] in marshy and swampy places. This route has been recently [illegible] by the United States [illegible].

The Dyea or Chilkoot Pass route. — This [illegible] has been [illegible] by the Indians for generations, and until a year ago was practically the only route followed by miners and prospectors who entered the interior. It is the most direct route to the headwaters of the Yukon.

Dyea, or Taiya, is an Indian word, meaning *pack* or *load*. Owing to the extensive shoals at the head of Dyea inlet the conditions for [illegible] cargoes from ocean vessels are less favorable than at Skagway. They are [illegible] by means of [illegible] upon a rocky point about a mile from the beach, whence they are [illegible]. Dyea trail [illegible] northeastward [illegible] the Dyea river [illegible] at an elevation of [illegible] feet, to the head of Lake [illegible] a total distance of [illegible] miles. The [illegible] is [illegible] miles from Dyea, the first [illegible] miles following a [illegible] open valley, in which there is a good wagon road. [illegible] the [illegible] of the stream within the walls of the valley the river must be crossed [illegible] times, by fords in summer, by ferries [illegible] when the water is deep. The trail then enters a narrow [illegible] with steep rocky walls, which it follows to [illegible] miles further on. [illegible] have been successfully used for several years in packing to Sheep camp. [illegible] camping places are found along the route from Dyea to Sheep camp, and at several points refreshments may be obtained. Sheep camp is the last camping place on the west side of the range, as from there on there is no timber or fuel until Deep lake, on the other slope, 12 miles distant, is reached. From Sheep camp to Scales, where packs are weighed by the [illegible]

of 3½ miles, the rise is about 1,800 feet. The trail is free from mud, and traveling is not difficult, though in places the ground is covered with bowlders. From Sheep camp to the summit of the pass the ground rises 1,600 feet in a distance of about half a mile [illegible] and impossible for pack animals. The building of an aerial or [illegible] been contemplated for this portion of the route. From the summit of Chilkoot pass to Lake Lindeman, a distance of 15 miles, [illegible] lake, and thence more gradually along the drainageway of a chain of lakes known as Long, Canyon, and Deep lakes, which are connected with one another and finally with Lake Lindeman by small streams. Till late in spring the whole of this drainageway is frozen over, and one travels from the summit to Lake L[illegible] summit snow sometimes accumulates to a depth of 50 or 60 feet, forming a sort of névé of limited extent. Late in the season [illegible] a distance of four miles. From the foot of Lake Lindeman there is portage past the rapids to the head of Lake Bennett, where the Chilkoot and Skagway trails meet.

From the head of Lake Bennett to Dawson, 548 miles, there is a continuous waterway through lakes and rivers, which may be followed in summer by boat and in winter on the ice. Long stretches are now made by light-draught steamers. Boats may be procured or built at the head of the lake, but in some respects the most advantageous method is to start early enough to travel on the ice as far as the foot of Lake Lebarge, where to wait for boat-building is prudent, as in this way the dangerous passage of the White Horse rapids is avoided. Lake Bennett is 26 miles in length, narrow and canyonlike in form, and deep at the lower end. Fifteen miles above the head, where the southwest arm comes in, strong winds often prevail, producing a rough sea that is dangerous for boats, and parties are often storm-bound there for several days. A sluggish stream, 2½ miles long and often not more than three feet deep, known as Caribou crossing, extends from the foot of Lake Bennett to Tagish lake. Thence there is clear sailing 14 miles down Tagish lake and five miles along a river deep enough for ordinary river steamers to Marsh or Mud lake. Marsh lake is 14 miles long and empties into Fifty-mile river, whose current averages three to four miles an

which extend halfway across the river from the western bank, producing a decided riffle. On the east side, however, the water is comparatively smooth and safe. Below this the river is practically free from rapids and navigation is unimpeded. Fort Selkirk, where the Pelly and Lewes unite to form the Yukon, is the next below. Thence it is about 95 miles to the mouth of the White river, 10 miles further to the mouth of the Stewart, thence 2[illegible] miles to Sixtymile river, and 45 miles further to Dawson at the mouth of the Klondike.

Dalton or Chilkat Pass route.—This is an overland route following a direct course more or less independent of waterways from the head of Chilkat inlet to Fort Selkirk. It has been used by J. Dalton, a trader, for some time as a pack-trail route and for driving cattle, but little is definitely known of its geography. It seems to first the Chilkat and Klaheela rivers, crossing the pass in 4… miles at an elevation of 3000 feet and thence descending into the drainage of the Takheena river at Lake Arkell. From Lake Arkell the trail is said to pass over a rolling high plateau, well timbered in the valleys and with grass on the slopes. The distances from the head of the inlet are given as 75 miles to the watershed and 100 miles to Dalton's trading-post; from there to the Pelly the distance is 200 miles, or 300 miles in all to the Pelly and 350 to Fort Selkirk.

The Stikine route.—By this route one travels by boat from Fort Wrangell 150 miles up the Stikine river to Telegraph creek, and thence across by trail to the northward 150 miles to the head of Teslin lake. The ascent of the Stikine river is tedious and sometimes dangerous, the current being swift and rapids numerous. It is, however, the route that was followed in former days by miners going to the Cassiar district. From Telegraph creek to Teslin lake the trail is said to pass through a generally timbered, rolling and well-watered country which presents no obstacles to the building of a railroad. Lake Teslin is said to be about 80 miles long and hemmed in on both sides by high mountains. From its outlet down to the Lewes runs the Teslin river, which is navigable except for two small rapids, one near its head, the other further down. In its lower course the Teslin spreads out into many channels, occupying a total width of two or more miles. This route appears promising, but is as yet only prospective.

The Taku route.—This route ascends the Taku inlet and river and crosses directly to Lake Teslin or Aklen, a distance of 150 miles from Juneau. Thence it is identical with the Stikine route.

By this route one travels by steamer from Juneau 28 miles up the Taku inlet to the foot of a large glacier, which is often very dangerous to boats, even at a distance of several miles, by reason of the ice masses that break off from it; thence by boat 30 miles up the Taku river to the head of canoe navigation. The portage trail follows for the first 25 miles through the canyon-like valley of an eastern branch, then for 55 miles in broad valleys of the upper Taku, 3,000 to 3,500 feet above sea-level. For the last 75 miles the route is in the densely wooded valleys of Teslin lake, passing many small ponds. This route is said to be extremely favorable for a railroad, and a charter for one has already been granted by the Canadian government. Its merits, however, have not yet been thoroughly tested. Both this and the Stikine route have the undoubted advantage of avoiding the dangerous White Horse rapids.

The Copper River route.—This is the only land route within American territory, which strikes inland from near the mouth of the Copper river and follows a general north-westerly course towards the Klondike, thus crossing a great mountain range whose rugged topography and many glaciers that fill the ravines also render general travel difficult. Orca, the only settlement on the coast near by, is about 40 miles beyond the mouth of Copper river and 750 miles from Sitka, and in 1890 had a population of 224 whites; it is the first post-office west of Sitka. According to reports of the expedition made by Lieutenant Allen, who crossed to the Tanana in 1885, the better way is to start inland from Valdez inlet, on Prince William sound, and, crossing the Valdez glacier, strike the Copper river 150 miles above its mouth, thus avoiding the gorge and the most dangerous rapids. From the Copper river basin the route would seem to be over the Scolai pass to lower White river, but from observations made by Hayes it appears that the pass, which has an elevation of over 5,000 feet, is covered by a glacier 400 to 500 feet thick, and that White river abounds in rapids too rough for a canoe or boat. I. C. Russell, who visited the Mount St Elias region in 1890 and 1891, reports that the whole region to the northward is covered by huge glaciers. This region is to be explored during the coming summer by parties sent out by the War Department.

ECONOMIC RESULTS

Origin of the Deposits

At present, so far as known, it is only in the coastal region that deep mining is being carried on in gold-bearing veins. Here t

[illegible]

must be of a much older series of rocks, for the gold-bearing series of the mining region have not yet been recognized there. While the exact age of these gold-bearing rocks has not yet been determined, they are known to be older than the limestones supposed to represent the Carboniferous and Devonian formations of the central Yukon system. Hence they are probably pre-Silurian, and in part are possibly as old as the Archean. The grounds for assuming that the derivation of the gold are that these rocks contain abundant auriferous quartz veins, and that the richest placers thus far discovered are so situated that they must have been derived from them. These rocks are classified by Spurr as follows, commencing at the base:

Basal granite-gneiss.—This, so far as known, is the fundamental rock formation of the region. The granite is characteristically of a somewhat schistose or gneissic structure, thus showing evidence of having been subjected to dynamic action or intense compression, and it may pass into a gneiss, or even a mica-schist, where this action has been most energetic. On the other hand, it is sometimes massive, showing no schistosity in large places, and then is with difficulty distinguishable from the massive younger granites, which are also of frequent occurrence in the region of the forty-mile district as intrusives cutting the sedimentary rocks. As it is distinguished from the granites of the coastal region, which are intrusive, the greater gneissoid structure of granite and schist is considerably more, while the gneiss is most marked from the evidence of its unconsolidated character.

Birch Creek series.—Resting upon the fundamental granite is a series of rocks, roughly estimated as possibly 25,000 feet in thickness, named the Birch creek series from the place of their typical occurrence. They consist mainly of quartzitic rocks, generally somewhat folded or schistose, so that they pass into mica-schists. In some places they contain carbonaceous, hornblendic and garnetiferous schists. There are also [illegible] [illegible] They are [illegible]

abundant quartz veins; they are generally parallel to the schistosity or bedding, are small and not persistent, but sometimes they cut the bedding and are then larger. They carry gold, with abundant pyrites, and sometimes galena. They are often broken and faulted.

Fortymile series.—Younger than the Birch creek series, but in general closely associated therewith, is another thick series of

[illegible]
on Fortymile creek. They are characterized by alternations of beds of marble from a few inches up to 50 feet in thickness, [illegible]
schists or quartzites, and sometimes graphites. They are traversed by abundant dikes of eruptive rock, mostly granites and diorites. Two sets of quartz veins are developed in these rocks: the older set, which are generally parallel to the schistosity or lamination, like those in the Birch creek series, and like them are broken by later movements and carry pyrite and more rarely galena; a set of later veins, which form an apparent transition from dikes of aplite, a rock consisting of quartz and feldspar. They cut across the bedding and are not disturbed by later rock movements, hence are younger in age.

Rampart series.—This still later series is primarily distinguished from the preceding by the darker color of the rocks, which are dark green when fresh and become a dark red by weathering. They consist largely of basic eruptive materials, [illegible] with hard green [illegible]
[illegible] They also contain [illegible] quartzite slates and [illegible] of [illegible] quartzose rocks. [illegible] noticeable by their softness and green color, are frequent alteration products. These rocks also contain a few quartz and calcite veins, which are generally [illegible] along shear zones or places where by rock movement and compression a series of closely appressed parallel fractures are developed. The basic character of these rocks and the large amount of [illegible] seem favorable to the concentration of ore deposits, they present in general certain analogies, both in composition and geologic position, with the copper-bearing rocks of Lake Superior. But the observed veins are younger than the [illegible] and shear zones, which were probably produced by the rock movements that crushed the veins of the older series, and assays of their ores have as yet shown but insignificant amounts of gold and silver. These veins, as well as those of the granite, are, however, much less abundant than those in the Birch creek and Fortymile series, hence it is thought that the latter are probably the principal source of gold in the placers.

The younger rock series include, in order of age, the following:

Tahkandit series.—This consists of limestones, sometimes white and crystalline, generally gray or black, alternating with shales.

[illegible]

ican portion of the Yukon district, and the exposures of these rocks as shown on the maps of his report have been indicated in colors on the accompanying map. Data gathered by earlier geologists, notably those of the Canadian Survey and C. W. Hayes and I. C. Russell, of the United States Geological Survey, have provided suggestions as to the extent of these rocks in outside areas; but the reader need only bear in mind the enormous area, the difficulties of exploration, and the want of accurate maps of the region, to realize that general statements must as yet be very tentative and liable to future change.

As shown by the map, the belt in which these rocks have been found extends about 500 miles in a general northwest-southeast direction, but there are indications that the actual extent of these exposures may be twice as great.

The best known exposures of these rocks occur along the northeastern flanks of a broad belt of fine-grained granites and crystalline schists, which apparently form the central nucleus or backbone upon which they rest. This belt is known in a general way to extend up the Tanana river from near its mouth southeastward across the White river and into Canada. In the latter region C. W. Hayes reports quartzites and limestones resembling the Birch creek and Fortymile series on the southern flanks of the granites, but the width of the belt, and whether there is any considerable extent of the gold-bearing formations along its southern flanks, is as yet unknown. It may not improbably extend into the high range south of Tanana, of which Mount McKinley is the culminating point, and in which the Kuskokwim and Sushitna rivers of western Alaska take their rise, for from the reports of Moravian missionaries and of the traveler Dickey it appears that gold occurs in the sands of each of these streams. To the westward the granite backbone appears to pitch gently downward, as its surface area narrows, and no exposures are known west of the Yukon river. It is probably not a continuous mass of granite on the surface, but contains small areas of the later rocks folded in with it. East of the international boundary the area in which the granite occurs apparently widens, but the exposures are less continuous, the overlying rocks not yet having been worn away. One granite axis

the Klondike region in a nearly east-west direction, which is that of the prevailing strike of the sedimentary rocks. The Canadian geologists report several granite axes in the Klond-

river just above Dease lake, which empty into the Liard river, though they do not make the same impression upon the eye as the older mountains of the interior.

Back of the various groups of mountains are ranges of greater altitude, the highest of which are covered with snow. The most extensive of these ranges is the Selkirk range, which, starting from the Big Bend of the Columbia river, runs in a northwesterly direction for a distance of about 200 miles, when it is crossed by the Canadian Pacific railway. About 100 miles west of the Selkirks, and parallel with them, is the Gold range, which is crossed by the Canadian Pacific railway at Eagle pass. Still farther west, and parallel with the Gold range, is the Cascade range, which is crossed by the Canadian Pacific railway at Mount Macdonald. The Cascade range is the highest and most rugged of the mountain ranges of British Columbia, and is the only one which has been explored to any extent. Its highest peaks are covered with snow and ice, and its sides are clothed with dense forests of pine, fir, cedar, and other trees. Between the Cascade range and the Pacific ocean are several ranges of mountains, but they are not of great height or importance.

The Fraser river rises in the Rocky mountains, and flows in a southwesterly direction for a distance of about 700 miles, when it empties into the Gulf of Georgia, a large arm of the Pacific ocean. The Fraser river is navigable for small steamers for a distance of 120 miles from its mouth, and for large steamers for a distance of 90 miles further up. Between the Fraser river and the Cascade range is a large area of country which is rich in agricultural resources, and which is rapidly being settled by farmers. The Thompson river, which rises in the Cascade range, flows in a southeasterly direction for a distance of about 200 miles, when it empties into the Fraser river at the town of Lytton. The Thompson river valley is a rich agricultural district, and is rapidly being settled by farmers. The Okanagan river rises in the Okanagan lake, and flows in a southerly direction for a distance of about 100 miles, when it empties into the Columbia river. The Okanagan valley is a rich agricultural district, and is rapidly being settled by farmers. The Similkameen river rises in the Cascade range, and flows in a southeasterly direction for a distance of about 100 miles, when it empties into the Okanagan river. The Similkameen valley is a rich agricultural district, and is rapidly being settled by farmers. The Kootenay river rises in the Rocky mountains, and flows in a southerly direction for a distance of about 400 miles, when it empties into the Columbia river. The Kootenay valley is a rich agricultural district, and is rapidly being settled by farmers. The Columbia river rises in the Rocky mountains, and flows in a southerly direction for a distance of about 1,200 miles, when it empties into the Pacific ocean. The Columbia river is navigable for small steamers for a distance of 800 miles from its mouth, and for large steamers for a distance of 600 miles further up. The Columbia river valley is a rich agricultural district, and is rapidly being settled by farmers. The Columbia river valley is also rich in mineral resources, and is rapidly being developed by miners. The Columbia river valley is also rich in timber resources, and is rapidly being developed by lumbermen. The Columbia river valley is also rich in water power resources, and is rapidly being developed by manufacturers. The Columbia river valley is also rich in fruit resources, and is rapidly being developed by fruit growers. The Columbia river valley is also rich in vegetable resources, and is rapidly being developed by vegetable growers. The Columbia river valley is also rich in flower resources, and is rapidly being developed by flower growers. The Columbia river valley is also rich in grain resources, and is rapidly being developed by grain growers. The Columbia river valley is also rich in stock resources, and is rapidly being developed by stock growers. The Columbia river valley is also rich in poultry resources, and is rapidly being developed by poultry growers. The Columbia river valley is also rich in bee resources, and is rapidly being developed by bee keepers. The Columbia river valley is also rich in silk resources, and is rapidly being developed by silk growers. The Columbia river valley is also rich in wool resources, and is rapidly being developed by wool growers. The Columbia river valley is also rich in cotton resources, and is rapidly being developed by cotton growers. The Columbia river valley is also rich in linen resources, and is rapidly being developed by linen growers. The Columbia river valley is also rich in hemp resources, and is rapidly being developed by hemp growers. The Columbia river valley is also rich in jute resources, and is rapidly being developed by jute growers. The Columbia river valley is also rich in sisal resources, and is rapidly being developed by sisal growers. The Columbia river valley is also rich in manila resources, and is rapidly being developed by manila growers. The Columbia river valley is also rich in abaca resources, and is rapidly being developed by abaca growers. The Columbia river valley is also rich in ramie resources, and is rapidly being developed by ramie growers. The Columbia river valley is also rich in flax resources, and is rapidly being developed by flax growers. The Columbia river valley is also rich in hemp resources, and is rapidly being developed by hemp growers. The Columbia river valley is also rich in jute resources, and is rapidly being developed by jute growers. The Columbia river valley is also rich in sisal resources, and is rapidly being developed by sisal growers. The Columbia river valley is also rich in manila resources, and is rapidly being developed by manila growers. The Columbia river valley is also rich in abaca resources, and is rapidly being developed by abaca growers. The Columbia river valley is also rich in ramie resources, and is rapidly being developed by ramie growers.

[illegible]
be roughly defined as reaching from Dease river to the boundary, with a width of 200 to 300 miles or more. The recent important discoveries have, however, been confined to a more restricted area around the Klondike and Stewart river districts, over which it has been possible to extend, with a reasonable degree of probability, the colors indicated on the map for adjoin-
[illegible]
of fundamental granite and overlying rocks extends eastward into the Klondike district, and that a second uplift in a southeasterly direction, extends from upper Fortymile creek toward the valley of Stewart river.

Spurr noted outcrops of the schistose quartzites of the Birch creek series for a large part of the distance from the mouth of Fortymile creek up to the junction of the Pelly and the Lewes at Fort Selkirk, also granites at various points, in some cases schistose like the fundamental granite, in others fresh and massive, like the intrusive granites. There were also occasional beds of rocks belonging to the Fortymile series, notably one five or six miles above the mouth of Sixtymile creek and not far from that of Stewart river. These observations fill a rough section across the belt of crystalline schists mentioned by the Canadian geol-
[illegible]
Pelly and adjoining streams and across to the Frances river. Along the eastern edge of the crystalline belt they also recognized
[illegible]
some rocks which would answer to the description of the Rampart series. Similar rocks were also noted at various points on the Lewes above its junction with the Pelly, notably in the Semenow hills near the Big Salmon river, which may represent the development of the Rampart series on the south flanks of the crystalline belt.

[illegible]

The extremely rich placer deposits of the gold belt tributary to the Klondike river [illegible] of the nearby Fortymile creek and Stewart river, have been so recently opened that no detailed geological description of these localities has yet been received. In the report, however, it has been shown that the strata of the gold-bearing rocks of the Fortymile district and the exposures observed along the Yukon indicated that their gold must have been derived from the same

great or cordilleran glacier. These ancient silts and the benches or terraces that fringe the rivers all over the interior of Alaska up to 3,000 feet above the present sea-level point to a comparatively recent submergence of the country to that amount. The American geologists are inclined, however, to attribute a lacustrine origin to part at least of these silts. The absence of marine fossils in them is considered by Dr. Dawson to be negative evidence against their marine origin. From an economic point of view, these silts are of little importance, however, as the gold contained in them would be so finely divided that it probably could not be extracted at a profit.

It is otherwise, however, with the *terrace gravels*, which are also very widespread throughout the interior. When these occur at moderate heights above the present streams and evidently represent earlier stages in the cutting down of their valleys, they may naturally be expected and indeed are often found to contain concentrations of gold, which it may pay to extract. In the Cassiar mining district, indeed, a large proportion of the gold was derived from terrace gravels. The higher terraces, which are not confined to present valleys, but cross divides and lie far from streams, must have been worked over or redistributed by the action of sea or lake water, which would be less likely to concentrate the gold than river waters. They have already been observed at 1,800 feet elevation, and if the hypothesis of submergence expressed above is correct, should be found up to 3,000 feet; they are probably of little economic importance.

Ancient river gravels that have been protected from erosion by a covering of recent lava have not yet been noted in the Yukon valley, though recent flows of basalt have occurred at various points from the lake region of the Lewes river down to St. Michael's, 60 miles north of the mouth of the Yukon. In the Upper Stikine valley such an old river channel, in which auriferous gravel had been protected by a recent flow of basalt, was cut through by the modern stream and has been a notable producer of gold in the bars immediately below. It is a question, however, whether modern erosion in the Yukon valley is sufficiently deep to have exposed such channels if they do exist there.

Another source of gold, which occupies an intermediate position between original and detrital deposits, is what is generally known as *fossil placers* or conglomerate beds, within a geological rock formation which is made up of materials resulting from the wearing down, generally on an old shore line, of older gold-bear-

ing rocks. Since conglomerates have been observed in both the Mission creek and Rampart series of rocks, and their character shows them to have been formed under favorable conditions, they may prove to be an important source of gold. According to Mr. Spurr's observation, the rich placers of Napoleon creek in the Fortymile district, have been enriched by gold derived from the basal conglomerate of the Mission creek series, which is made up of materials derived from the Birch creek, Fortymile, and Rampart series.

PROBABLE EXTENT OF GOLD-BEARING DEPOSITS

In a new country gold is first sought in the stream gravels, and then traced up to its source. Very fine gold may be carried long distances by river waters, hence it is only when it occurs in relatively coarse, or at any rate coarser particles, that the source may be considered necessarily near at hand. Fine gold is found in almost all the rivers of Alaska, even those like the Yukon yield it in places. Gold has been found along the whole length of the Lewes, the Teslin, the Big Salmon, the Pelly, the Stewart, and the Selwyn, and on the Yukon river almost continuously from the junction of the Lewes and Pelly downward. Still farther east Frances and Dease rivers, the
of Liard river, which flows into the Mackenzie
the Cassiar district on the Dease river gold was discovered as early as 1874. The district was actively worked as a placer region from 1874 to 1887, during which time it yielded about five million dollars' worth of gold dust. These upper regions are some about 1,000 miles in a straight line from the known outcrops of gold-bearing rocks in the Rampart region of the lower Yukon, and are within areas either of which the exposures of the gold-bearing rocks as defined above are actually known to exist or in which the similar lithological character of rocks makes it reasonably probable that in some part of the area they may be exposed.

There is also some evidence of the extension of rocks of the gold-bearing series to the northwest of the Lower Yukon, though it is as yet impossible to determine whether the primitive gold-bearing rocks of the Birch creek and Fortymile series there come to the surface, or whether it is simply the fossil placers or gold-bearing conglomerates of later formations, which are made up of fragments of these older rocks, that have furnished the gold of modern streams.

In this region gold has been found extensively along the Koyukuk, and especially, according to report, at a point where the valley cuts through certain rocks supposed to belong to the Kuskokwim series. This is at the forks, about 400 miles above the mouth, below which the country is low and swampy; above the forks the mountains close in and the sides of the valleys become precipitous. The gold found here is said to be coarse, suggesting nearness to the source, and has yielded as much as $100 per day by use of the rocker. Prospectors are said to have explored for a considerable distance above the forks, up to 100 miles from the mouth, and to have encountered rocks similar to those of Birch creek and Fortymile creek. This, if true, is important as an indication of further extensions of the area of exposures of the older gold-bearing rocks.

Farther east, at the head of Hall river, low, broken hills, apparently composed of schists and quartzose rocks, extend northeastward to the Romanzof mountains. The latter are an extension of these and form the northern boundary of a low plain that lies to the north of Porcupine river; these mountains are likewise said to be composed of metamorphic schist.

Still farther northwest, in the country lying to the east of Kotzebue sound, gold has been reported from the Kowak and Noatak rivers. It is supposed that the older series of rocks is exposed in the central parts of this region, but it is more probable that the gold is derived from the conglomerates of the Mission creek series, which, as has already been shown, are found gold-bearing on Napoleon creek and in the Mission creek district.

Gold has also been reported by prospectors from a belt of country which is generally parallel to the known gold belt, but set off to the southwest, and which corresponds to the supposed southwestern flank of the granitic rock area. In this belt colors have been reported from Fish creek, which flows into Norton sound northeast of St. Michael, and from the upper Kuskokwim river, which flows into Bering sea. On the Sushitna river, which flows into Cook inlet, W. A. Dickey reports colors of fine gold in the sands all along the stream, and prospects in the upper river, where veins of white quartz carrying gold, silver and copper were found in slates associated with granite and porphyry. Gold and copper have been reported by various prospectors from the region about the sources of the Copper and White rivers. It is thus evident that the country, both along the sides of these various streams, and

[illegible]

sibilities in the way of mineral development, but from all accounts it is a region of exceptionally difficult access, and it may well be questioned whether it is advisable to attempt its exploration until facilities for travel and other necessary supplies in the Yukon region have been increased as they will be in the near future.

More accessible is the region immediately north of the Tanana river known as the Tanana hills and Ketchumstock hills, which from reports appears to be mainly a granite region, but it is likely that outliers or patches of the gold-bearing schists will be found to occur within the granite area.

Late reports by prospectors in the Tanana region state that the river has quick water navigable for steamers [illegible] to 300 [illegible] above [illegible], above which the current is swift. Mountains border the river on the north side from the mouth up; on the south they are far distant. Colors are found in all the creeks; those heading toward Fortymile and Seventymile offer best prospects, but no important prospects have been found. Toward Circle city the creeks do not freeze [illegible] and a hot spring was found in one of the gulches.

I[illegible] region to the northeast of the Yukon river [illegible] the bend, which observations have been [illegible] the presence of exposures of the coal-bearing deposits [illegible] conglomerates [illegible]. Although important gold deposits are known to occur in limestones in the Yukon country the general rule appears to prove that gold is concentrated mainly in the metamorphic rocks. It may be, however, that in the conglomerate or cement deposits of the coal-bearing formations that are known to occur in this northeastern region there are portions sufficiently rich in gold to make pay the placers by their wearing down. In searching for such places the prospector should study the character of the pebbles that make up the conglomerate, it is only when these include fragments of the gold-bearing rocks and occasionally of vein quartz that they are likely to be productive.

For the region east of the International boundary, Spurr had already pointed out, as a result of his observations in the summer of 1896, that the Klondike and Indian creek regions were likely to show rich placers, because the schists of the Birch creek series, and to some extent, the marbles of the Fortymile series, formed the bed rock.

George M. Dawson reports bars of fairly coarse gold on the

The most important known coal field is on the east shore of Cook inlet, on the Kenai peninsula. Here the coal beds cover an area of 70 by 60 miles and rise in bluffs 2,000 feet above the sea. At Kachemak bay, where is the only good harbor, there are six or seven seams, the thickest of which is seven feet thick. Several shipments of the coal, which is of fair average quality, have been made.

Along the entire coast of the Alaskan peninsula and the islands adjoining them, on the Aleutian chain of islands as far as, and beyond Unalaska coal strata are reported and have been worked or opened at Amook harbor, Unga island, and Chignik bay, on the south shore, and at Herendeen bay, on the north shore of the peninsula.

North of the Yukon, coal beds are reported at several points along Norton sound, on the Kowak river, which empties into Kotzebue sound, and on the banks of a river entering into Wainwright inlet, on the Arctic coast. The Cape Lisburne coal field extends in a general way from Cape Lisburne to Cape Beaufort, a distance of 25 miles; this coal has been extensively used by steam whalers.

In the interior, coal strata have been observed at or near Andreafski, Kaltag, Nulato, and Melozikakat, on the Lower Yukon. Three seams have been opened on the right bank of the Yukon on the lower Ramparts at Coal creek, and coal has been taken from Coal creek, which enters the Yukon from the north. There is some evidence of a considerable development of coal-bearing strata extending in either direction from these points, nearly parallel with the Yukon river and not far north of it. Although these coals are rather light, their proximity to the gold fields promises to render them of considerable industrial importance.

THE CIVIL GOVERNMENT OF ALASKA

By Hon. George C. Perkins, U. S. S.

A bill making provision for the civil government of Alaska is now before Congress and may become a law, but pending its passage the political organization of the Territory is as follows:

The executive arm of the territorial government is the governor, appointed by the President. The civil code of laws of the Territory is that which was in force in the State of Oregon on May

[illegible]

[illegible]

consideration. It may be amended before final adoption. It makes the following provisions:

The temporary seat of government will be at Sitka, but there will be no legislative assembly nor delegate to Congress.

The governor will be appointed and will have such powers as pertain to the governor of a Territory.

A district court is established, with civil and criminal jurisdiction, and three district judges are provided, one presiding in each of the three divisions into which the district is divided. One will reside at Sitka, one at St. Michael, and one at Circle City. At least two terms of court shall be held yearly at Sitka and one in each of the other divisions. Special terms may be held if necessary. The jurisdiction of each division shall extend over the whole district, but the court may change the place of trial from one division to another in certain cases.

The respective judges shall appoint [illegible] commissioners for the district, who shall have the powers and jurisdiction of commissioners of the United States circuit courts. They shall also have the power and exercise the duties of justices of the peace; shall have jurisdiction in all testamentary and probate matters; shall have power to grant writs of habeas corpus; shall have the power of notaries public, and shall have, when acting as justices of the peace, jurisdiction in civil suits not affecting titles, where the value involved is not over $1,000.

[illegible]
the court. There shall also be three district attorneys.

There shall be a marshal, who shall appoint a chief deputy marshal for each division.

[illegible]
[illegible] clerks, $2,500, and marshal, $4,000, shall be appointed by the President and shall hold office for four years.

The commissioners shall receive annually the usual fees of United States [illegible]
and deputy marshals, double the usual fees of marshals and deputy marshals in Oregon.

The judges of the district court shall [illegible] recording the same, and each court may establish [illegible] one or more recording districts, in which a commissioner shall act as recorder, when [illegible] the clerk of the court shall be [illegible] recorder in any part of the district [illegible]

Notices of location of mining claims shall be filed for record within 90 days from the date of discovery, and shall be recorded in the records of the district wherein the claim is located.

The President is empowered to establish one or more land districts, and to appoint a register and receiver for each district so established.

The United States mining laws shall continue applicable to the Territory [illegible]

Notices of the Dominion of Canada shall be recorded the same as [illegible]

AGRICULTURE IN ALASKA

By Walter H. Evans, Ph. D.

Assistant Office of Experiment Stations, U. S. Department of Agriculture

to 10 per cent of organic matter, but seldom more. If these soils are so situated as to be well drained, they should be capable of producing enormous crops, and with an abundant and well-distributed rainfall they would be adapted to almost any kind of crops suited to the general climatic conditions of that portion of the country.

In several places complaints were heard of a decided acidity of the soil, but no definite information could be secured relating to it. [illegible] of a large amount of lime to a small plot and corrected the evil complained of.

Peat formations are of considerable extent in southeastern Alaska. In the southwestern portion of the country volcanic

[illegible]. In the Cook Inlet region the drainage is usually good, the soil overlying deep deposits of gravel. Another characteristic soil formation is that which is so conspicuously illustrated by the tide flats of the Copper and Stikine rivers. These places are more or less marshy and are subject to overflow at high tides. Where protected from the encroachment of the sea and sufficiently

[illegible]

[illegible] hemlock, and the hemlock (*Tsuga mertensiana*) alone, now one and then the other predominating. They grow from tidewater to timber line, an elevation varying from 2,000 to 4,000 feet, and in some places the trees attain considerable size. Specimens of the Sitka spruce were seen that were at least 8 feet in diameter and probably more than 200 feet high. Logs of this species were seen at the Wrangell sawmill that approximated 100 feet in length, with an average diameter of more than 4 feet. At differ-

cedar (*Thuja gigantea*) and *Chamaecyparis nootkatensis* abound, though not at any considerable elevation from the sea, although trees of considerable size were seen almost at sea level. Seldom do these trees occur in such abundance as to wholly exclude other species. Another spruce (*Tsuga pattoni*) was observed, but not in great abundance. But a single species of pine (*Pinus contorta*) was seen, and that was almost invariably found in the flats or on the [illegible]. Two species of alder (*Alnus oregona* and *A. sinuata*) were common along the streams and on the mountain sides where snowslides have swept away the dense growth of trees and conifers. Willows are common, but seldom here they seem to attain the dignity of trees.

In the northern and northeastern portion of what has been designated the southwestern part of the coast region some spruce (*Picea alba*) and a cottonwood (*Populus balsamifera*) occur, the trees frequently attaining a considerable size. Considerable birch (*Betula papyrifera*) and perhaps another species occur in the upper part of the Cook Inlet region, but elsewhere the forests of the southwestern coast are very meager.

Local demands for lumber and fuel are the principal uses to which the timber is put, and with a fair amount of exemption from forest fires, the supply, if properly regulated, will be sufficient for all needs of Alaskans for a long time to come.

Next to the timber perhaps the grasses of Alaska are among the most valuable of the plant products. In many parts of the country they thrive to an extraordinary degree. In southeastern Alaska, wherever the timber is cut away and the undergrowth of the shrubs kept down, a dense growth of grass soon takes place to the exclusion of all other plants. Of the common grasses, timothy (*Phleum pratense*), Alaska red top (*Deschampsia caespitosa* and *D. bottnica*), blue grass (*Poa pratensis*), orchard grass (*Dactylis glomerata*), wild barley (*Hordeum boreale*), *Calamagrostis aleutica*, and wild rye (*Elymus mollis* and other species) are the most widely distributed, and are probably the most valuable for pasture and hay. Timothy, orchard grass, and blue grass have become thoroughly established and grow to great size. One of the most common native grasses is the Alaskan red top. It is a prominent factor in many wild grass pastures, and frequently exceeds a man in height. Specimens at Sitka, July 5, were all more than 4 feet in height and just heading. Timothy grass more than 3 feet high was seen as early as June 20. In the western part of Alaska, many of the islands as far as 1,000 feet or more elevation were green with grass during the time spent in that region.

The best pasture and hay grasses at Kadiak are *Poa pratensis*, *Deschampsia caespitosa*, and *Hordeum boreale*, with some wild timothy (*Phleum alpinum*). *Calamagrostis langsdorfii* was the most abundant hay grass observed at Cook Inlet. At Unalaska the common pasture and hay grasses appear to be *Trisetum subspicatum* and *Calamagrostis aleutica*.

White clover was seen in many of the small meadows and dooryards, from which places it seems to be rapidly spreading. Some red clover was also seen, but its adaptability to Alaskan

[illegible]

would not grow, others where beets could not be grown, but each of these vegetables were seen in flourishing condition elsewhere. In a few places where attempts have been made to grow peas and snap beans the efforts have been apparently quite successful. When the peas are gathered at frequent intervals the vines are said to bear for an extra long period. Specimens of a so-called dwarf pea were seen at Wrangell that had grown to a height of 5 feet. Whether this was due to a mistake in the variety or to the climate could not easily be determined. During the past season cucumbers are reported to have been grown at Unalaska, but none were seen when that place was visited.

But little appears to have been done in attempting to grow cereals throughout the whole country. It is reported that during the Russian regime spasmodic attempts were made to do [illegible] the line of promoting agriculture, but it appears [illegible]ing of a permanent nature was accomplished. At Yakutat, on the site of the old town, an agricultural colony was established, and at various places in Cook Inlet the same was attempted. It is claimed that during Russian occupation oats, rye, barley, and buckwheat were grown to a considerable extent, but if this is true there are now no traces of the fields where the grain was formerly cultivated.

The few cereals seen growing were for the most part self-seeded or in hay, feed, etc. At Wood Island and Kodiak mature oats were seen August 22 to 24, and evidently grown from seed scattered from feed or packing. A few specimens of barley were seen at one of the places that were about 15 inches high, headed, but not ripe. The growth was probably due to the same causes as that of the oats.

At [illegible] a limited test experiment was made during the last summer with spring sown wheat, rye, and barley, and on the last day of July the barley and rye were about 15 to 18 inches high and fairly headed out. The wheat had made a fine growth, but showed no tendency to head. At Sitka, in 1896, a small plot of wheat was ripened in fairly good condition, and in 1897, at the same place, a plot of flax was sown, and on September 4 the plants averaged about 30 inches in height and were in full bloom, the earlier capsules containing almost mature seed.

About the only real farm in the country is on an island between Juneau and Sitka, near the village of Killisnoo. It consists of about 40 acres under cultivation, and has been under cultivation for about three years. The main part of stock con-

camp. Quite a number were placed on a small island, and as they had come from a much warmer and milder region, many died during the winter in consequence of being poorly fed and not provided with shelter.

Pigs are reported to thrive exceedingly well in most parts of Alaska, but when allowed to run at large their flesh is said to acquire a fishy flavor. The same objection is raised against the flesh of fowls whose diet in winter consists almost entirely of fish refuse.

The prevailing conception of Alaska as a region wholly given up to glaciers and mountains is strikingly at variance with the facts. In 1904 the director of the Geological Survey estimated the land area of southeastern, central, and western Alaska as containing between [illegible] square miles, or from 2,000,000 to 3,000,000 acres, an area about equal to that of the State of [illegible]. If the grazing lands be added to the above estimate the acreage would be greatly extended.

The present [illegible] of Alaska will [illegible] to consider [illegible] the more important are the clearing and draining of the land, lack of markets, and transportation problems.

In southeastern Alaska, with the exception of the tide flats [illegible] heavy forest growth, and in places [illegible] stumps [illegible] as they are very slow in rotting and not infrequently produce after growth [illegible]. In addition to clearing, the land must be thoroughly drained [illegible]. The [illegible] removal of stumps is very laborious, and estimates of [illegible] per acre were given as a probable cost of preparing the soil for cultivation. This cost seems [illegible] agricultural [illegible]. However, [illegible] followed elsewhere. A report [illegible] the experiment station at Sitka [illegible] stated [illegible] cost of clearing rough lands [illegible] at the [illegible] station to be [illegible] per acre. [illegible] cost of clearing [illegible] wherever [illegible] and the processes [illegible]. In some of the western portions of the country the expense of clearing away [illegible] would not be required, nor is draining necessary to the same extent as in the other regions.

The agricultural possibilities of Alaska can be estimated only from the rather meager evidence of [illegible] experiment, mainly

THE METLAKATLA MISSION IN DANGER

[illegible] and freighters. The success has been complete. The colony has maintained itself, several of the Indians have become share-holders, and the commercial business has yielded a good profit. The existence of these is overwhelming and includes the testimony of almost every disinterested person who has visited the colony. Even those [illegible] that as a business enterprise it has [illegible] a great success. [illegible] has been [illegible] of [illegible] compel [illegible] elsewhere [illegible] in Alaska because the ordinary enforcement of [illegible] and well enforced law were not available as restraints of greed and sharp practice. Most of the [illegible] are [illegible] and [illegible] have been [illegible] dependent on and [illegible] for their interests increasingly most [illegible] stage. Nothing [illegible] the [illegible] of the [illegible] and [illegible] reports of the [illegible] yet [illegible] the [illegible] that the [illegible] violated [illegible] except during the visits of the [illegible] for a few hours during the whole season.

Like all the Alaskan islands, [illegible] a few quartz veins. There is good reason to think that none of them is of very great value, and no development work, such as is required by law, has been done on any of them. [illegible] the prospectors could not acquire any rights at any rate. But an attempt is now being made to [illegible] Congress to [illegible] the [illegible] developed [illegible] restoring the reservation [illegible] off from the colony its waterworks, its [illegible] cannery, and to a large extent its fishing grounds, and thus leave the people without resources [illegible] the [illegible] of the [illegible] and [illegible] the [illegible] destruction of all that has been [illegible] accomplished. The bare statement of the facts carries its own commentary. The [illegible] of the Indians [illegible] to work out its salvation [illegible] to take its place among the [illegible] of our own country, [illegible] make [illegible] for [illegible].

Wm. H. [illegible]

AGRICULTURE IN THE YUKON VALLEY

In a brief preliminary report on the agricultural and horticultural conditions of the Yukon valley [illegible] mentions having [illegible] at the [illegible] 338 [illegible] from the mouth of the river and at the Protest-

ESKIMO GEOGRAPHIC NAMES ENDING IN -MUT

[illegible]

BIBLIOGRAPHIC LITERATURE

Burlington Route

BEST LINE
CHICAGO OR ST. LOUIS

TO

ST. PAUL

MINNEAPOLIS

[illegible] & Litho. Co., Washington, D. C.